THE FOUNDRY

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A Visit to the Foundry of Wm. Sellers & Co., Incorporated, Philadelphia.

In these days when foundrymen are giving so much attention to the subject of modern equipments, anything on the subject is always appreciated and we feel sure that the following account of a visit recently made to the foundry of Wm .Sellers & Co., Philadelphia, who have one of the most modern and best equipped plants in the country, will prove especially pleasing.

We refer to but few of the many very complete features of this shop, but what we do mention are among the most valuable, besides having the additional merit of being especially designed for the use to which they are put by those who have

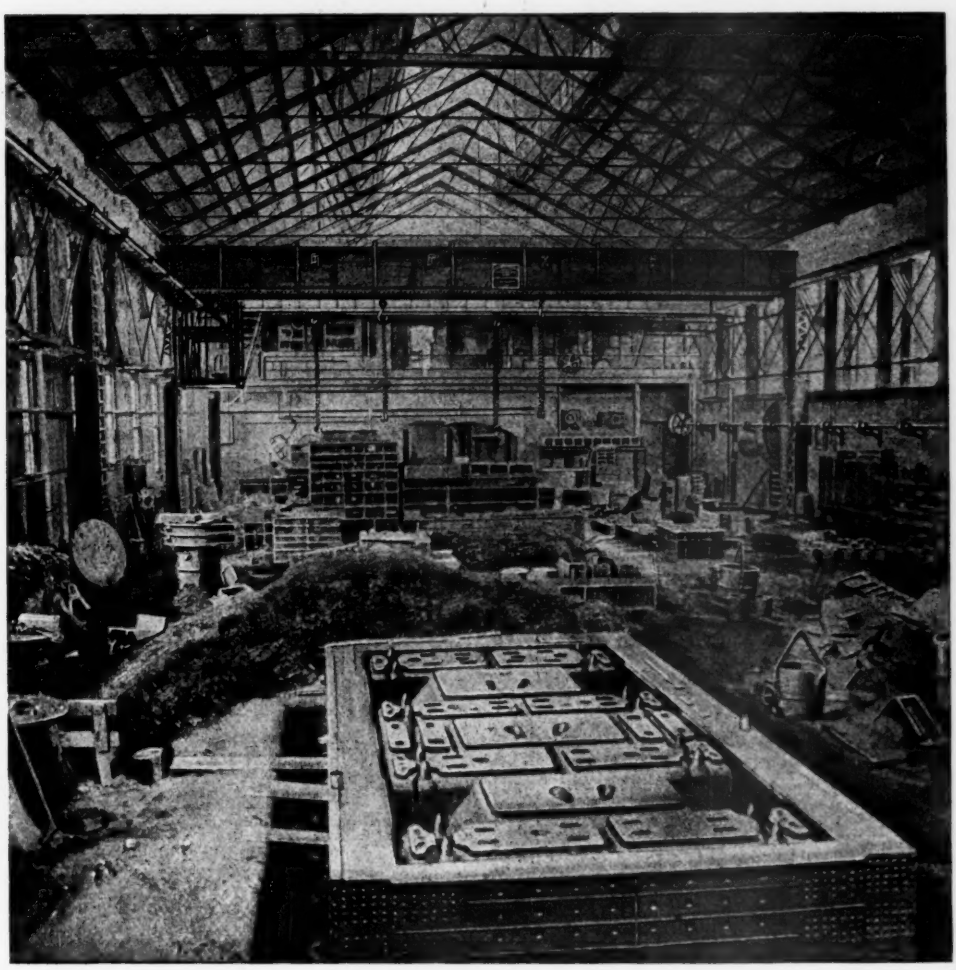

Fig. 1.—Interior of Foundry with view of Travelers.

learned by experience their need and value.

So well has this fact become generally known and understood that foundrymen in many parts of America have availed themselves of this experience and secured improved machinery from this source, and while not regularly engaged in that business, their equipments are considered to be as nearly perfect and lasting as it is possible to make them.

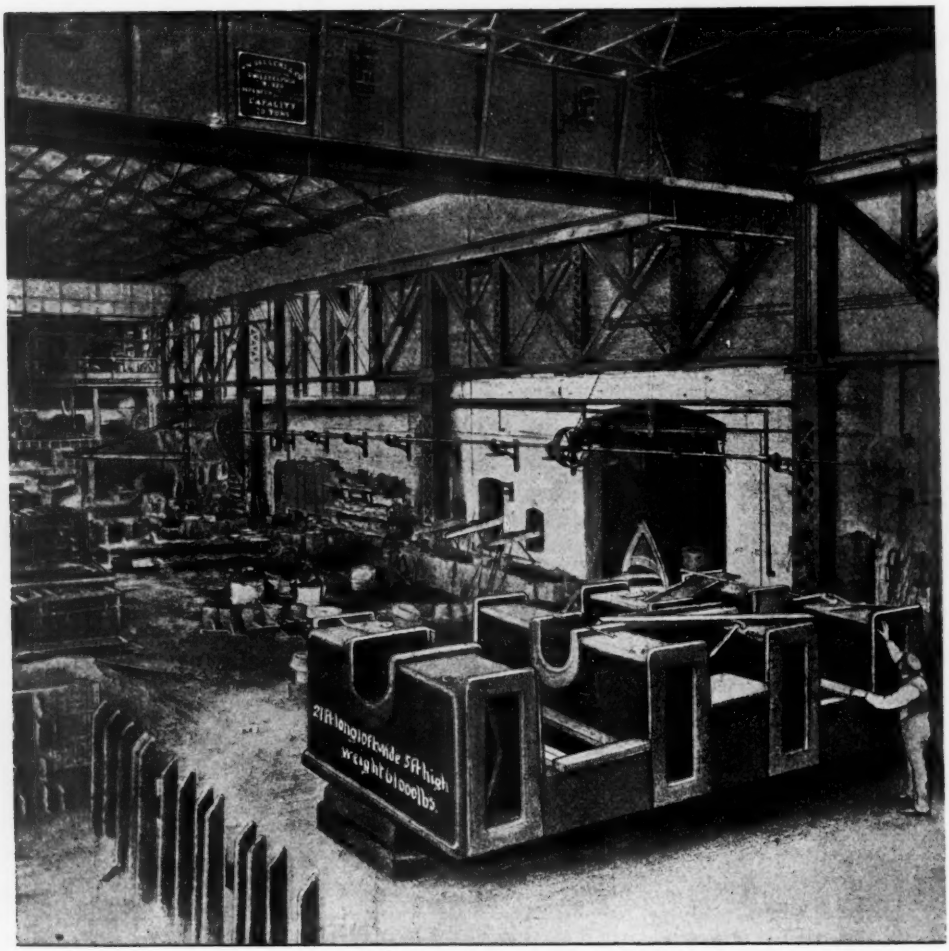

Fig. 2.—Bed Plate for Air Compressor in fore ground.

The foundries and pattern shop of the machine tool works of Wm. Sellers & Co., Incorporated, occupy a lot of ground 400x 181 feet, contiguous to, but separated from, the various machine shops comprising this extensive plant.

The foundry buildings are plain, substantial brick structures, mainly one story, with high peaked roof, large windows, ample ventilators, and having a system of pipes for heating with exhaust steam in cold weather. The main foundry is 204x80 feet, the auxiliary foundry (in which pulleys, hangers, couplings and miscellaneous small castings are molded by machinery) is 76x80 feet, and beyond this is the "Flask Shop," which is 78x80 feet. A pattern shop and loft 203x78 feet, and a cleaning room 103x 78 feet, together with boiler houses, core shops and other buildings, have gradually encroached upon the yard room for storage of pig iron, flasks, etc., and the question of economizing storage room in a central city locality, where real estate is worth a great

many dollars per foot, has led to some peculiar and interesting developments which will be adverted to later on in this description.

The only really ornamental feature noted from the exterior, is one which generally impresses itself upon an observer of such purely utilitarian buildings as a necessary obtrusive eye-sore, viz., the chimney. This is a graceful structure rising 109 feet 4 inches from the floor to the top of the cap. It consists of an interior cylinder or flue of iron lined with brick, and an outer casing of brick constructed in the shape of an eight-pointed star, gradually contracting in diameter, to a point about three feet below the top, when it opens out like the corolla of a lotus flower. An immense cast iron cap (13 feet in diameter), gracefully shaped, binds the structure firmly together. This form of chimney was designed by the late Asa Whitney, and immediately attracted attention by its intrinsic merit and its artistic beauty, only the extra cost of construction prevented its more general use.

The main foundry was, in former years, equipped with a number of large jib cranes for handling the heavy castings, and the first step towards modernizing the foundry practice at these works—which have earned a reputation as pioneers in various new methods—was the discarding of all of these cranes, and the introduction of modern high-speed overhead traveling cranes. Finding it impossible, at this time, to obtain in America, or in England (which country had, practically, a monopoly of the business), a form of traveling crane which attained the desired speed of movement, or provided the necessary factors of safety, economy and convenience of handling sought for, the Sellers Company were finally led to devise and build their own traveling cranes; these proved so successful in their foundry, and so far superior, in the particulars noted above, to any foreign or American cranes then in existence, that they were induced to incorporate the manufacture of such cranes into their business, and it has grown to be a very large and important feature and is still continually expanding. This change, though a radical one in the foundry, did not present itself as an entire novelty to this firm, for the reason that, as long ago as 1853, when some of the shops were completed, several traveling cranes were con-

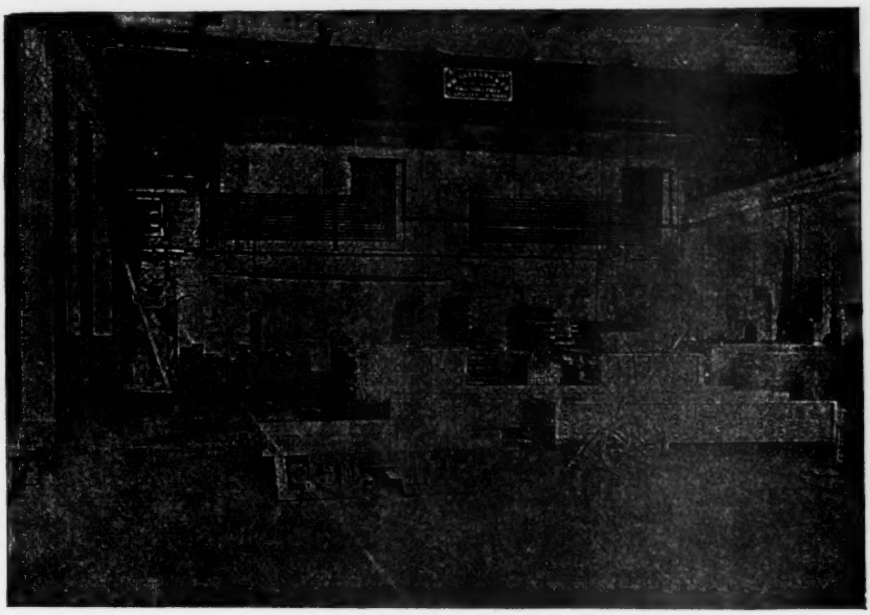

Fig. 3.—Interior of Flask Shop with 6 ton Electric Traveler.

structed and installed. These were operated with wire ropes and hand chains, and, although slow in movement and crude in construction—when compared to the modern highly developed crane mechanism—the germ, nevertheless, was found therein. These old-time travelers, which were excellent constructions in their day, had proved themselves, through many years of daily use, reliable and vastly superior to the best form of jib crane in respect to economy of floor space, enlarged compass of movement (avoiding the necessity of depositing the load at the circumference of each circle of swing of the jib), and consequently economy of time and labor in handling heavy material. It was, therefore, only a natural and easy step in the march of improvement, to elaborate the principles inherent in the original travelers, substituting iron bridge girders for wooden trusses, mechanical—or electrical—power for hand movement, adding friction clutches and other safety devices, with quick running gearing and enormously increased lifting capacity, to have evolved the complete modern traveling

Fig. 4.—Centrifugal Sand Sifting Machine.

crane, without which it would be impossible to handle ponderous masses of iron and steel, composing the great engineering structures of to-day, economically and quickly.

Since the Sellers Company embarked upon this special business, they have constructed traveling cranes of every conceivable design and method of operation, ranging in size from a lifting power of a few thousand pounds up to one hundred and fifty tons capacity.

The photographic illustration No. 1 gives a clear view of the interior of the main foundry, looking east, showing a 30-ton power traveling crane operated, as seen in this plate, by a square shaft (supported in patent "tumbler-bearings"), running the entire length of the buildings along the wall. Beyond this crane, chains may be observed depending from another traveling crane of 26 tons capacity, which was originally operated by the same square shaft, but subsequently used for experimental work in the application of electric motors to cranes. All of the movements are now made by electric power, and although the bridge travels on the same runway as before, the square shaft is no longer used. The platform on which the conductor sits is shown under the crane immediately beneath the square shaft. The operator has an unobstructed view of the field of work, and the necessary movements by levers or hand wheels have been reduced to extreme simplicity, while the accuracy is such that no difficulty is experienced in the delicate operation of closing the largest mold; such an accident as a "sand drop," due to a misfit of cope and drag in closing, is practically unknown. Both cranes are brought into requisition in handling some of the very large molds and heavy castings. The "drag" half of the large mold in the foreground of the picture, being prepared for casting a bed plate for an air compressor, will convey a pictorial impression of the size of the work handled more graphically than an elaborate description would do, and illustration No. 2 shows the casting itself after being removed from the mold and the pit in which the flask was sunk. The bridge of the 30-ton traveling crane is nearly over the head of the corpulent workman who is inspecting the casting, and the pouring runners of the three cupolas may be seen near the main entrance.

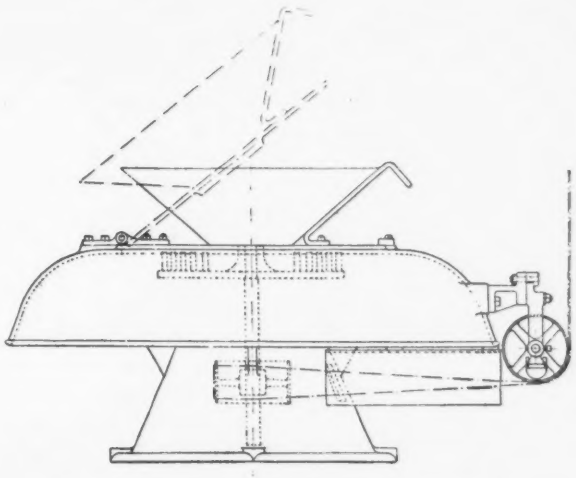

Fig. 5.—Sectional view Sand Sifting Machine ground Drive.

One of the peculiarities hinted at in the introductory portion of this description, is the total absence of wooden flasks with their partly charred boards and clumsy carpenter work. In place of these antiquated and crude wooden appliances, we observe that all the trim looking molds are built in iron frames, an elaborate system of interchangeable cast iron flask bars, machined on their ends to insure good fit, and provided with a network of bolt holes, enables the foundry foreman to have constructed flasks of all sizes, and provided

with the necessary cross bracing bars to suit the intricate chapes of patterns, from the stock of flask bars which are stored in very small space. This installation is, doubtless, too costly to suit the means of the average founder, but its advantages in superior stiffness of flasks, neatness of appearance, and economy of storage roof are self-evident. The end of the large mold shown in plate No. 1 gives a good idea of the form of these bars, of which the entire flask is constructed.

The small interior view (No. 3) shows a special 6-ton "all electric" traveling crane installed in the flask shop, which does not require the services of a regular crane operator, but is handled by any workman in the shop, the platform being readily accessible from the floor. This crane is used solely in the construction of the iron flasks (a number of these of various sizes and shapes may be seen on the floor), and in loading the flasks, when completed, on flat cars running on a narrow-gauge track, from whence they are moved into the "main," or the "auxiliary," foundry.

A full description of the mechanism and operation of the traveling cranes would occupy too much of our space; moreover, the subject has been fully treated in various periodicals, and the practical progressive foundryman is presumably familiar with these necessary adjuncts to most modern foundries.

A very interesting apparatus that fills a long-felt want in this foundry, and is equally applicable to others, is a portable "CENTRIFUGAL SAND MIXING MACHINE," which accomplishes, by the aid of two men working the machine for three hours a day, as much work in preparing facing sand for the molders, as five men working ten hours were formerly able to do. Such a saving soon pays the cost of the machine. The core sand is also prepared by this machine.

Formerly it was necessary, before riddling, to spread the sand, when wet, on drying plates placed over a hot flue; the sand and bituminous coal dust were mixed into "batches" of ten to twenty barrow loads each, it was then passed through the riddles which were operated by belts from the line of shafting. Including the wheeling from the sand bins to the drying plates and riddles, and delivery of the prepared sand to the molders' floor, an output of about nine tons per day represented the work of five men. Damp sand is in just the proper condition for immediate delivery to the centrifugal machine; the drying pans are, therefore, no longer used; the handling has been greatly reduced, and the time required for the most intimate and thorough mixing of materials and disintegration of lumps depends entirely upon the speed with which the men can shovel the sand into the hopper. If the sand is mechanically fed to the hopper, one machine will readily and thoroughly prepare ten tons, or more, of facing or core sand per hour. A brief

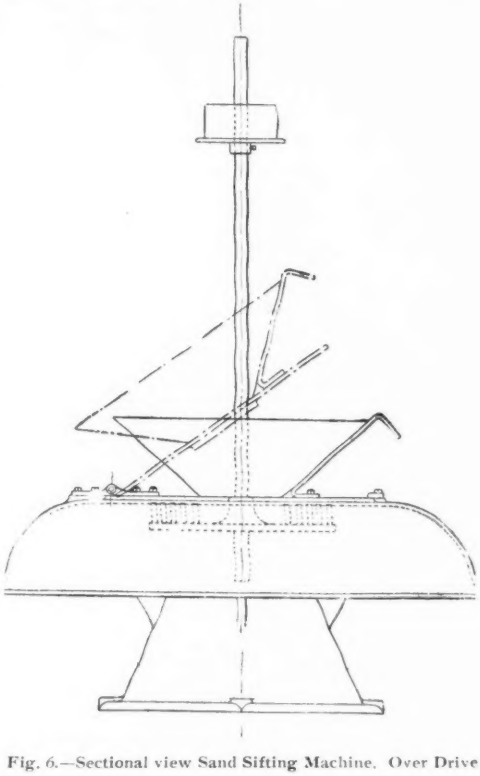

Fig. 6.—Sectional view Sand Sifting Machine. Over Drive

description with illustrations of this remarkable economizer may prove of interest to our readers. The half-tone illustration (No. 4) shows an apparatus about 3 feet high with a round cast iron umbrella-shaped shield or cover, the whole presenting an appearance not unlike a magnificent toadstool. The outline pictures (Figs. 5 and 6) show the details of construction very clear-

ly. The machine consists, essentially of a rapidly revolving table, having upon its upper surface a number of prongs grouped about a central axis; the sand is fed through a hopper and thrown by centrifugal force from prong to prong, emerging from beneath the cover in a fine shower. free from lumps, and thoroughly mixed.

The hopper is hinged for convenience of cleaning the revolving plate and prongs, and for removing stones, nails, etc., which cannot pass between the prongs. A vertical shaft carries the revolving plate and a pulley for the driving belt. One of the cuts shows the flanged pulley placed above the machine, the other shows an "under drive" method. The Sellers Company also furnish the apparatus provided with a small electric motor, and the machine may be carried to any part of the foundry that is most convenient for its operation.

There are a number of additional appliances used in these foundries which are more or less novel and interesting, chief of which, perhaps, is the Vicars' "Mechanical Stoker" for feeding the boilers. by the aid of which bituminous "slack," or any other combustible material, is consumed under the boilers, without smoke emerging from the chimney. An account of this appliance may be looked for in a subsequent issue, together with a description of the brass foundry in which the coring of castings has been brought to a remarkable degree of perfection in the making of modern automatic self-adjusting injectors, which are now shipped, in large numbers, to all parts of the world, including France, the birthplace of the original Giffard injector, a crude affair indeed compared to the modern apparatus which has been so marvelously improved in construction and simplified in operation as to constitute practically a new invention. The name of Giffard is retained as an act of courtesy to the discoverer of the principle involved (which remained for a long time a scientific paradox), but Giffard would scarcely recognize his own invention in its present form. The evolution of the injector is the result of a long series of elaborate experiments and tests made at the works of Wm. Sellers & Co., Incorporated, the briefest possible description of which would extend this article beyond its prescribed limits.

Pressure on Molds.

HERBERT M. RAMP.

No one item in foundry practice has so little data or reliable information to work upon as the pressure of castings in pouring, on the flasks, cores, anchors, clamps and other rigging that is used to resist such pressure.

Every foundryman or molder has his own individual ideas about these things, how castings should be secured, what sized anchors and clamps are necessary, what lumber is essential to make flasks of, in order to have them remain rigid under the strain, how iron flasks should be constructed to prevent any spring or cracking, and how much is needed to hold down a certain cope, or core, or both. Yet how few set down and resolutely figure out what strain a casting will give, every way, what the cores will have to stand, and what the fixtures are capable of resisting, and do their work upon a safe and practical basis. Good judgment is the necessary element in these matters, but human judgment is fallible, and often work is lost by our best mechanics through mistaken judgment.

I think the assertion safe that more work is lost through these causes than all others, unless it be the injudicious use of the rammer. How many run-outs through lack of a sufficient number of clamps improperly placed, how many cores raise or break through insufficient or light rods and anchors, how many castings strained or swelled because the flask was not strong enough or properly supported? Hundreds

TABLE NO. 1.

Pressure on square areas at varied hight of gate:

Dimensions. In. sq.	6-in. gate.	8-in. gate.	10-in. gate.
12x12	216	288	360
18x18	486	648	810
24x24	864	1,152	1,440
30x30	1,350	1,800	2,250
36x36	1,944	2,592	3,240
42x42	2,646	3,528	4,410
48x48	3,456	4,608	5,760
54x54	4,374	5,832	7,290
60x60	5,400	7,200	9,000
66x66	6,534	8,712	10,890
72x72	7,776	10,368	12,960
78x78	9,126	12,164	15,206
84x84	10,584	14,112	17,630

of such items occur daily through depending on judgment as to what will hold a certain pressure, being at the same time in

total ignorance of the true pressure we are seeking to resist. A more thorough knowledge of such things is necessary to the business before we can say with certainty what pressure we have to provide for.

Many molders have no conception of the real force or pressure on molds, and many more have absurd and wild ideas on the subject. Some believe it takes more to hold down a cope on a plate three inches thick than on one that has a thickness of one-half inch, of the same area, and some will go so far as to say, "Three times the weight of a casting will hold it," and believe that, regardless of area. Others use just what they "think" will do, and let it go at that. Such practice, of course, hits sometimes, but sooner or later meets with a shock that completely destroys the fabric they have erected, and the misfortune is laid to "Bad Luck." The first thing to learn is the actual pressure on molds, and foundrymen to be safe and exact in their work, must give some attention to this part of the business. The tables here given, though rather crude and incomplete, and possibly of little practical use, will reveal at least an idea of the foregoing, and in some cases prove instructive. Their object is to bring into notice the immense strain some of our rigging is subjected to. Of course anyone can figure out these areas and pressures, but how few do it, and besides it entails considerable work at some times, and if these were kept handy, they might often same time and conjecture.

Table No. 1 gives the pressure on a number of square plates, of different dimensions, with varied hight of gate, yet how often do molders stop to think there is a difference whether they are using a six or ten-inch cope. In a plate seven feet square, the difference in such a case would be as shown in the table, three and a half tons, or a total pressure of almost nine tons. Assuming such a plate to be made in a flask eight feet square, it is exerting a strain of nine tons on bars, nailed in very often carelessly, and wonder expressed if the plate is thick in the middle and crooked from that cause. Also if the gates are brought up full and it runs out, the molder is blamed for "straining it," and not for the true cause of lack of weight. How many have seen nine tons of weight put on a surface presenting forty-nine square feet of area to hold it down? The amount seems unnecessary, yet it is required with a ten-inch cope.

Next take a plate forty-two inches square, and see how it has to be treated. Granting a ten-inch cope is used and the pressure 4,410 pounds, with four clamps, as is often the practice, in flasks of that size it is exerting a pressure of eleven hundred pounds on each clamp, and if they are placed on pine wedges it gives an admirable opportunity to sink into the soft wood the sixteenth of an inch, and cause the much to be deplored run-out. In building and using flasks for such work, some appear to forget the greatest strain on a flask is in the center. A large plate, of course, presents a uniform surface and receives a uniform pressure, but like a girder or lintel hung at both ends, and strain applied uniformly its entire length, the weakest point is the center, just so with flasks. Iron bars should be used in such copes, or when that is impractical, as is often the case, on account of work that has lugs or ribs in the cope, and of varied design, care should be taken to clamp a rail or girder across the center and securely wedge every bar to it. Table No. 2 is very similar to No. 1, but shows very strikingly what pressure we often expect six or eight clamps or a couple of weights to hold. Take a plate from ten to twenty feet long and two to three feet wide, with an eight or ten-inch cope, and see the

TABLE NO. 2.

Pressure on rectangular areas at varied hight of gate:

Dimensions. Inches.	6-in. gate. lbs.	8-in. gate. lbs.	10-in. gate. lbs.
24x12	432	576	720
36x12	648	864	1,080
48x12	864	1,152	1,440
60x12	1,080	1,440	1,800
72x12	1,296	1,728	2,160
84x12	1,512	2,016	2,020
96x12	1,728	2,304	2,880
36x24	864	1,152	1,440
48x24	1,728	2,304	2,880
60x24	2,160	2,880	3,600
72x24	2,592	3,456	4,320
84x24	3,024	4,032	5,040
96x24	3,456	4,608	5,760
48x36	2,592	3,456	4,320
60x36	3,240	4,320	5,400
72x36	3,888	5,194	6,490
84x36	4,536	6,048	7,560
96x36	5,184	6,912	8,640

amount of strain we expect our few clamps to hold and our weights to resist. For plates longer than eight feet any other number can be doubled or thribled, as the case may be, from the given figures, and the strain quickly ascertained, or if a plate is four feet wide twice the amount given for two-foot width will answer the same purpose. In no place are we so deficient in judgment as in pressure of depth, as table No. 3 will convince the most skeptical. Here is where we have made many mistakes in building flasks, and expecting pits of soft or treacherous ground to do good service. The table is based on an average-sized cope, namely, eight-inch, but also contains figures for the depths of six and ten-inch flasks, and shows the entire strain per running foot upon such work at different depths. We know the strain is greater at the bottom than the top, but the figures given ar the aggregate for the entire depth. Notice first a flange or rib cast on edge, six inches wide and ten feet long, and see what pressure so shallow a casting will exert in pushing sideways. The table shows 198 pounds per foot, at eight-inch cope, or a total of 1,980 pounds in the entire length.

TABLE NO. 3.

Pressure per running foot of surface at varied depths:

Depth of casting.	Pressure at 6-in. gate. lbs.	Pressure at 8-in. gate. lbs.	Pressure 10-in. gate. lbs.
6 inches	162	198	234
8 "	240	288	336
10 "	330	390	450
12 "	432	504	576
16 "	672	768	864
20 "	960	1,080	1,200
24 "	1,296	1,440	1,584
30 "	1,890	2,070	2,230
36 "	2,592	2,808	3,024
42 "	3,402	3,654	3,906
48 "	4,320	4,608	4,896
54 "	5,346	5,670	5,994
60 "	6,480	6,840	7,200
66 "	7,812	8,118	8,514
72 "	9,072	9,504	9,936

Possibly a flask made from two-inch lumber with no bars or bolts may be used. Will such a piece of lumber, namely, 12x2 inches, ten feet long, stand a pressure of 1,980 pounds and remain rigid, with no security in the center? Again, take a column, twelve inches square, and fourteen feet long, a very common length and size, and see what an enormous strain is on the sides of the flask or pit. Such a depth would receive a pressure of 504 pounds per foot on each side, or a total for one side of 7,056 pounds, making the lumber in both sides and the bolts and bars connecting them subject to a strain of over seven tons, if a flask were used.

You can often see such flasks built. and used with only a couple of light iron bars to hold the drag together, placed six or seven feet apart, when in other machinery no one would dream of risking so much. If seven tons were to be lifted, no one would attempt to do it with a couple of thin cast iron plates a few inches wide, yet observation will show us rigging that is used daily where the strain is far in excess of what our best authorities claim as the limit. With increased depth our pressure follows accordingly; columns are often made thirty inches deep. See what strain a flask or pit is subject to in such a case, placing the length of the column at twelve feet. The table gives 2,070 pounds per foot, or a total on both sides of almost twenty-five tons, yet we wonder our rigging fails or pits give away.

TABLE NO. 4.

Pressure on pulleys or cylinders cast on end:

Dia. inch.	12 in. deep. lbs.	24 in. deep. lbs.	36 in. deep. lbs.	48 in. deep. lbs.	60 in. deep. lbs.
6	339	1,356	3,051	5,428	8,472
12	679	2,712	6,102	10,848	16,950
18	1,017	4,068	9,153	16,271	25,425
24	1,354	5,418	12,190	21,670	33,862
30	1,696	6,786	15,268	27,144	42,412
26	2,034	8,136	18,306	32,544	50,850
42	2,376	9,504	21,384	38,016	58,400
48	2,713	10,854	24,421	43,416	67,836
54	3,016	12,066	27,148	48,264	75,412
60	3,393	13,572	30,537	54,288	84,825

Take extreme depths, say six feet. A running foot that depth would exert a strain of nine and a half tons on the clamps or on both sides the pit. Of course, the pressure would only be two pounds per square inch at the top, but at the bottom it would reach the enormous pressure of twenty pounds per square inch, and provisions must be made accordingly. Table No. 4 embraces pressures on pulleys or other round bodies cast on end for several diameters and different depths, and is of the same use as table 3, and shows what a pressure some of our molds are subjected to, but

differs from table 3 in not adding a hight for gate. For example, take a 60-inch pulley, 60-inch face, it shows a total strain on outside surface of over forty tons. Is it strange that sometimes our judgment is at fault and our flasks, pits, binders or other rigging give away and cause disaster?

Table No. 5 treats of lifts on round cores. Here is a place where sometimes ideas are

TABLE NO. 5.

Lift on round cores, per foot:

Diameter.	Pounds lift per foot.
1 inch	.5
2 "	6.
3 "	13.5
4 "	24.
5 " "	37.5
6 "	54.
7 "	75.5
8 "	96.
9 "	121.5
10 "	150.
11 "	171.5
12 "	216.
13 "	253.5
14 "	294.
15 "	337.5
16 "	384.
17 "	433.5
18 "	484.
20 "	600.
24 "	864.

mixed. No matter what the hight of gate may be, or weight of casting, the pressure or lift is always the same, and excuses for broken or raised cores are very unsatisfactory, for the minute the iron covers the core, all the lifting pressure it will receive is accomplished, for the increased hight has pressure on top the core, as well as the bottom. This table gives the lift per foot, and from this it is easy to determine the size and number of anchors and rods necessary to hold and support the same.

Table No. 6 contains the lift on circular areas from twelve inches in diameter up to eight feet. This will be of service in computing lift on cores in drums or anything that has circular areas. Assuming a drum sixty inches in diameter and twenty-four inches deep to be cast, what is the lift on core and cope, separately and combined. At six inches hight the table shows a pressure of 4,241 pounds, which sum multiplied by four, as the drum is twenty-four inches deep, gives a total pressure on the core of 16,964 pounds. If the cope is eight inches deep it will give a pressure then of 5,654 pounds, a total on the cope and anchors of 22,518 pounds. What size and kind of anchors do we usually put on such a casting, and what bearing do we give them? If four were used it would be exerting a strain of over two tons on each anchor. These things are worthy of consideration. There are many other ways we might multiply to simplify our system of computing pressures, but we must arrive at a more thorough appreciation of their value and truth, before we accomplish any great change in reducing the amount of bad work made in our foundries through ignorance and carelessness in this direction. Those embodied here are not as thorough as desired, but their tendency will be to call attention to those things so often overlooked and neglected. They can be used in numberless ways, and adopted to suit different forms and shapes, by the use of a little of the condemned judgment.

Different hights of gate than those given on the cope areas can be easily ascertained by multiplying the given hights, and in many other ways used to an advantage.

Much of our present practice is to secure

TABLE NO. 6.

Lift on round areas at different hights.

Diameter.	6 in. hight. lbs.	8 in. hight. lbs.	10 in. hight. lbs.
12 inches	169	226	282
18 "	382	509	636
24 "	678	902	1,126
30 "	1,060	1,413	1,767
36 "	1,525	2,034	2,543
42 "	2,078	2,770	3,463
48 "	2,714	3,618	4,523
54 "	3,335	4,480	5.625
60 "	4,241	5,654	7,067
66 "	5,131	6,842	8,552
72 "	6,107	8,142	10,178
78 "	7,167	9,551	11,945
84 "	8,325	11.100	13,886
90 "	9,542	12,723	15,914
96 "	10,857	14,476	18,095

until we think our work is secure, and if not make it over and try again. This condition must and will cease to a large extent in many of our foundries, at no distant date.

This subject involves so much it was only possible to touch it here and there in this article and it is also possible my next article will treat of some of the methods to resist such pressure.

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THE FOUNDRY is issued promptly on the tenth of each month, and will spare no endeavor to furnish valuable news and information to those interested professionally or incidentally in molding, melting, mixing of metals, foundry management, etc. Persons connected with any of these lines of industry will confer a favor upon the Editor of this Journal by sending him news from their section of the country pertaining to the foundry interests, particularly individual theories and experiences of practical value.

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The Trade Outlook.

Concerning the condition of business THE FOUNDRY would simply point to the reports appearing in the columns of the daily papers, trade journals, etc., to the effect that this or that concern employing men in some cases numbering over one thousand, have raised wages 10, 12 or in some cases 15 per cent.

The extent to which this has become fashionable possesses some amusing and interesting features. In certain localities where no increase of wages had been given and some one concern has felt called upon unasked perhaps to post a notice to the effect that after a certain date an additional 10 per cent would be given, the example thus set has become quickly a general rule, followed by all in similar lines of business.

While the iron and steel trades have, of course, been the chief beneficiaries thus far, other lines are already beginning to feel the effect of more prosperous times and are certain to follow suit later on.

In the foundry line proper the chief event of the past month was the rapid rise in price of pig iron, it having gone up on all lines at least a dollar and on some even more. Many well known brands are out of the market altogether, being sold up for several months to come, but it is said that with one or two exceptions, where furnaces are controlled by private interests and are making special irons for special purposes, that any of them will accept orders for September delivery.

Prices are not likely to go higher except perhaps in exceptional cases, but the idea that the advance will be followed by a number of idle furnaces going into operation and by that means increasing the supply to the extent of weakening prices is, we think, an erroneous one.

A few are likely to be blown in, but in many cases they are small or not able to secure raw material at a price that will enable them to make iron at February prices. In addition to this the increased and increasing consumption is likely to keep things as they are for some time to come.

The expected advance in coke has not and is not likely to materialize. As the coke industry is practically in the hands of but few parties, they are unable to get together ow-

ing to a general lack of confidence in one large producer and as a result coke users will get the benefit, as coke at $1.40 or $1.50 per ton would be cheap.

The foundry business, taken as a whole, is much better and continues to improve. Of course certain lines like agricultural, sawmill work, etc., are through their busy season.

Makers of stationary engines, electrical equipments, mining machinery, machinery for manufacturing iron work, cotton, wool, wood, etc., all seem happy. Pipe foundries are busy and many car plants, while marine work is picking up and the stove foundries are feeling encouraged to keep their full forces at work.

Announcement.

THE FOUNDRY is pleased to be able to announce that it has completed arrangements with Mr. W. J. Keep whereby we will be able to give our readers each month hereafter an article from that gentlemen's pen on the subject of cast iron.

In some respects we believe Mr. Keep the best posted man in the world on the subjects he has given so much time and thought to studying. His researches supplemented by actually thousands of experiments on the subject of the value of "The Physical Test" for cast iron have made him famous not only on this continent but in Europe as well.

While giving due credit to the chemist for all he has done and is doing to assist the foundryman to solve some of those problems which confront him, Mr. Keep has insisted that it was not necessary to be a chemist to be able to scientifically mix the iron in the cupola or buy it economically in the office. Any of our readers who may have any questions to ask Mr. Keep through our columns will be cheerfully and fully answered as far as possible. It is our intention to give the subject of cast iron in all its bearings hereafter the full degree of attention the rapidly growing importance of the subject demands.

The Danger Passed.

There seemed to exist a possiblity during the earlier days of this month that the rapid rise in the price of pig iron and other iron products might lead to a boom in prices and witness the inauguration of a speculative movement. Now that the probability of this happening has been greatly modified, if not indeed entirely removed, we feel as if all interested were to be congratulated.

A boom of that sort would have worked much injury to the whole business in many ways, besides unsettling it temporarily, and the final collapse of the boom would have been a serious drawback to the present and prospective improvement in the iron business. Prices are quite likely to be maintained, as we have pointed out elsewhere, but the buying up of large quantities of iron to hold for future speculative purposes or any unwarranted advancing of prices is not likely to occur.

Krank's Korner.

The number of foundrymen who do not keep track of anything, are adverse to doing so, who are indifferent to knowing how their money is spent, as long as it comes in is surprisingly large. Keeping account, so their answer runs, avails nothing, for they are as economical as possible, and the idea of writing everything down would only result in extra expense, even if pencils and paper are cheap.

* * *

These same people would likely resent being called fatalists, yet their position justifies this application to the fullest extent of the word. They look upon the course which their business follows as an inevitable necessity. The keeping of a cost system furnishes at all times a reliable directory, a guide by which bad roads may be avoided, and more than one firm can testify to its merits as being the only help they have had in several close transactions, that enabled them to locate mysterious leaks and turn out a profit instead of a deficit.

* * *

With a manufacturing concern comprising several departments, it would be natural to suppose that each would be held accountable for its own expenditures, and that care would be taken to have information in this respect readily accessible. Instead of this we find the foundry ordering and accepting goods from the blacksmith, carpenter, machine shops and other departments. These in turn call on the foundry, and so it goes

all through the establishment. When a bad showing is made one department will prefer charges of extravagance against another; this brings on counter charges, and without a cost system they are absolutely safe in quarreling, for there is no way of adjusting their bemuddled affairs.

* * *

The fact that things may be changed and ordered from one department for another one without leaving the premises, should not be considered a valid excuse for neglecting to take account of it. A cost system is a map; without one you may land at your destination all right, but if you do in these days of rivalry, it is a lucky star that is guiding you. Many a firm can trace their failure directly to the neglect of keeping a cost spstem. Their margin of safety was overstepped through ignorance of what it cost them to fulfil former contracts. Their past experience should be valuable enough to be kept as a record, but how many people there are who attempt to carry everything in their head.

* * *

Asking a manufacturer recently what it cost him to build a certain machine, he replied that it cost him almost nothing "except for a little patternwork." He was a man who had no cost system or he would have made no such an answer. By not having one he had so far deceived himself to believe that he was obtaining something at a far greater advantage than actually existed. Some of these home-made contrivances, built for "almost nothing," would not appear so very cheaply with a cost system in vogue at their homestead.

* * *

As a reference for future calculations, what can surpass a cost system? As a basis for close figuring in contracting, what can be better? It is a record of experience. True, it can not be had for nothing, but how much are we getting nowadays, outside of politics, without paying something for it. A cost system is a series of hard, cold facts, pure, unadulterated, without one atom of theory or guesswork about them.

* * *

In speaking of a cost system here reference is made to any way in which a constant account is kept, including not only material but the cost of labor expended thereon as well. By its use there need be no groping in the dark, or doubt as to where mistakes are made. It directs one right to the place where economy may be effected. Every step can be retraced. Can this be done otherwise?

* * *

In connection with the foundry it may not be out of the way to call attention to the fact that there are some which expect their foremen to do too much. The keeping of an entire cost system and the running of a shop, if it is of any proportions, should not be consolidated. It is too much. Shop practice should not be sacrificed for it, as it is often done, and everything is condemned as unsatisfactory.

* * *

Many managers make some sort of a promise for reform every New Year. They know they ought to swear off from the habit of running their business without a programme, without any chance at all for looking backwards. A large percentage of these keep a cost system for about three days and then get tired of it like the boy keeping a diary, and their promise for a brighter future has gone the way of most New Year's promises. Such action does not signify, however, that it is a failure to know what you are doing and have done, it simply shows that there is too much work connected with it to be an agreeable task for all.

* * *

Different ways of keeping a cost system need not be considered here. The main point is to have one of some kind. Keep the cost of everything, even if it is a trifle, instead of winking the other eye and say you will put it down when you begin to check up, which you will not.

His Report.

President Martin Fox, in his address delivered before the twentieth session of the Iron Molders' Union of North America, who have been holding their convention in Chicago, takes an exceedingly conservative stand on many questions affecting that body and makes several suggestions, most of them good ones.

The Iron Molders' Union is a fixed, recognized and powerful factor in the foundry business of the country. All must admit

this, even those who are not at all in sympathy with it, its methods or objects. Much of the severe criticism it receives is laid at its doors because of the lack of judgment, prejudice, yes, and ignorance of its members. If the molders of the country were to more universally respect its doctrines and laws, there would be much less friction between employers and employes. Concerning the question of grievances, the President said:

"Our laws governing grievances with amendments added thereto, providing that members involved in questions or disputes with employers shall remain at work, pending an investigation by one of the national officers, have strengthened the position of the Union and proven beneficial in all cases. My experience has been, by frequent trials, that where members had a grievance and remained at work pending an investigation, the question at issue could invariably be handled better and with more satisfaction than when the members impulsively left their work. It is far better to sacrifice a few interests for the time being to subserve the general good of the whole Union, than to have the members act on the impulse of the moment and thereby endanger all chances of settlement; and the practice of hasty and ill-considered action can not be too severely condemned, when it is known that uncertainty and evil consequences are sure to follow."

Had this policy been adopted earlier in the history of the Union and rigidly enforced seventy-five per cent of the disturbances that have occurred would have been avoided and much of the stigma that in latter days still sticks to the Union would not be there to further embitter what should be pleasant relations between employer and employes.

Even as it is, the amount of money spent in strikes is a very large sum, and it is to be hoped the better understanding that now exists will enable it or most of it to be saved in future.

On this subject the report says:

"The following table shows, in condensed form, the number of grievances in which no adjustment could be effected, and which were referred to the consideration of the Executive Board, with the attending results:"

It will be observed that of the 127 grievances submitted a greater number were caused by a proposed reduction in wages than anything else, and these items, it is to be hoped, will not again be so prolific of trouble, as molders' wages could not be much lower.

Again, of the 127 fully one-quarter were disapproved, and of the remaining only one-half are claimed as successful, while several were compromised.

Cause of Grievance.	Submitted.	Approved.	Disapproved.	Successful.	Compromised.	Lost.	Pending. Still	Members Involved.	Amount Expended.
Increase in wages..	28	23	5	14	1	6	2	1455	$44,038 97
Against reduction .	51	36	15	10	7	18	1	1544	120,355 10
Lockouts	8	8	..	2	3	3	..	137	12,230 08
Union principles ...	40	27	13	11	4	12	..	639	25,799 89
Total	127	94	33	37	15	39	3	3775	$202,424 04

Concerning the relations of the Union with the Stove Founders' Defense Association the report has much to say, the concluding paragraph being as follows:

"In the past two years much has been said and written on the question of conciliation and arbiration—compulsory arbitration having many zealous and warm advocates—but it must be admitted that our meeting with the Defense Association to settle all disputes and wages, was the only thing that made it possible to maintain the molding rate in the stove branch during the past two years, and it is to be hoped that this convention will endorse every action and advance so far made, and extend the powers of the committee. Our relations with the Sove Founders-National Defense Association have given the organization recognition and standing such as has never before been accorded it, and has proven indispensable to the prevention of strikes, and the only hope to obtain

that equality of power and force which leads to respect, friendly relations, consideration and forbearance."

Among the recommendations made are the enactment of more stringent laws to prevent the possibility of strikes without a proper attempt being made to adjust and compromise the difficulty, to prevent the too severe punishment of members for trivial offenses, the improvement of the card system, and the raising of the initiation fee to five dollars.

The adoption of one universal set of By-Laws that would be the same in all locals and thus prevent the conflicts occasionally arising from the present system, and the adoption of a good apprentice system.

On this latter subject the report very wisely says:

"To limit the number learning the trade should not be so much our aim as to control them in such a manner as to compel the employer to make a mechanic out of his apprentice, and in this every member ought to assist that he may become proficient. Could such an agreement be entered into by the manufacturers and our organization, there would then be less apprentices, better workmen and better work turned out, and less cause to complain of incompetency."

Concerning the Journal, he recommends some changes, in the line of enlarging, improving and accepting advertisements with which to meet the entire expense.

Concerning the hours of work, he favors a reduction, and says:

"It can be truthfully said that while other trades have reduced the number of hours for a day's work, the molders have no limit to theirs, except that of the hour of commencing, which in certain branches of the trade and in quite a number of places is totally ignored. Ten hours is supposed to be the rule, but in many foundries little if any attention is paid, even to this, molders being compelled to remain until the cast is finished, which often keeps them after the regular hour, with no additional pay for extra time, such as is allowed workmen at other trades."

This is a slap at those foundries, happily few in number, where the men are late nearly every night, owing to the desire on the part of over-grasping employers to get a day and a half's work in one, a system that is equally as unfair, if not more so, to the employer who does what is right as it is to the employee.

After referring to a great many other matters of interest only to the organization, Mr. Fox concludes his address by congratulating the members on the good financial condition of the Union and thanking them for the support they and its officers have given him during the past term. The address is an unusually good one, and no harm and much good might be accomplished by mailing a copy of it to every foundry proprietor in the country and distributing copies among the molders generally. Both parties might see in it things from which they would differ, but all would learn something.

The Western Foundrymen's Association.

The regular monthly meeting of the Western Foundrymen's Association was held Wednesday evening, June 19, 1895, at the Great Northern Hotel, Chicago, Ill., the president, John M. Sweeney, in the chair.

The executive committee reported that they had completed the papers for incorporating the association, and that they were in the hands of Mr. Frake, who would send them to Springfield; also that the committee on the revision of the by-laws were at work on them and would report at the next meeting. The following applications for membership were presented, and, on motion, duly seconded, were unanimously accepted: A. Sorge, Jr., of Chicago, Ill., and D. De La Fontaine, of Chicago, Ill.

The secretary then read the following question, which was presented for discussion: What is the cause of small, round, clean holes in castings in the solid parts? Can you tell me how to prevent the holes?

G. M. Sargent: I suppose these holes are caused by air that had been confined in the iron and tried to escape, but the cooling of the iron had prevented it from escaping, causing the holes.

A. Sorge, Jr.: I do not agree with Mr. Sargent in that. That condition would indicate an accident; and I do not think this gentleman would ask this question if it had simply occurred in one piece. I should judge that there had been a series of these difficulties. I do not think it is what we call "cold shut." That not only shows itself in the shape of the small hole, but also by

the presence of a small ball inside of the cavity. I do not know that it is possible to answer a question put in this shape. The chances are that the shape of the casting and method of molding have a great deal to do with the confined gases that should be aided to escape. It would be impossible to answer the question and state a remedy without seeing what they were doing and where the difficulty occurred.

Mr. Santial: I agree with Mr. Sorge that these small blow holes are principally due to gases in the castings which have not had a chance to free themselves in the cooling. I would suggest, as a slight remedy, the addition of a little manganese in the ladle.

A. Sorge, Jr.: It is almost impossible for a doctor to prescribe medicine unless he can see his patient. What is the article in which these holes occur; and what is the character of the holes? It seems impossible to tell whether they are due to gases or to vapor, water or steam, or due to some faulty method of molding which does not allow the gases to escape from the mold. I happen to know in this case that their mixtures are a good deal at fault.

A. W. McArthur: At the risk of prescribing in the dark, I would say that I have found it beneficial to stir the iron with a steel rod while it is in the ladle.

A letter on the subject of cranes from Thos. D. West, intended to suggest a topic for discussion, was then read, and many of those present took part in the debate which followed, after which the meeting adjourned.

An Open Letter from the President of Western Foundrymen's Association.

Western Foundrymen's Association.
Office of the Secretary,
1522 Monadnock Block.
Chicago, June 17, 1895.

To the Foundrymen:

At the annual meeting of the Western Foundrymen's Association, it was unanimously decided that its best interests would be advanced by incorporating the association under the laws of the State of Illinois. This will at once be done, and will relieve members from any possible liability in the conduct of the affairs of the association.

The association is now in its third year, and as its formation was closely followed by the panic of 1893, the members feel highly encouraged over the success which it has had, and believe the Association must have a brilliant future. The purpose of the association need only be understood to insure a greatly enlarged membership and an increased interest in its affairs.

The objects of the association are not in any way connected with questions of trade, either prices, product, or rates of wages paid; they are purely and clearly technical, and it is the purpose to make the meetings a medium for the interchange of ideas, of practical experience in founding, so securing from each other knowledge of methods of procedure in certain cases, the consideration of the application of chemistry to foundry business, new methods of molding and the handling of finished, unfinished or raw products.

As these objects are more clearly understood, the meetings of the association will become more and more interesting, and it is only necessary to attend a few meetings in order to thoroughly understand what the benefits may be, if followed up.

The cost of membership is extremely low. The initiation fee is five dollars ($5.00) and the annual dues ten dollars ($10). The literature which is sent out by the association, and which becomes the property of the members, is alone worth vastly more than this amount. A membership taken out by one concern entitles any of its members to attend the meetings of the association, and to join in its deliberations and the discussions of its papers.

It is particularly desired that members of the association shall endeavor to have their managers, superintendents or foremen attend the meetings of the association, and join in the discussions. It is the interchange of ideas that the association wishes to procure and put into its records. The association wishes every one to feel entirely at liberty to discuss questions at its meetings, or to contribute papers on matters from individual experience.

If you are not satisfied to send in your application for membership, through inability to attend all meetings, join the association and secure its literature and attend at least some of the meetings.

It is the purpose of the association to arrange, if possible, to hold some of its meet-

ings at other points than Chicago, and as the membership grows, this policy will be followed up with the idea of holding them at various other places, which will enable the members to visit establishments of note and interest to the foundrymen outside of Chicago.

Yours respectfully,

J. M. SWEENY,
President.

Another Record Broken.

In this record-breaking age we are being constantly made aware of the phenomenal advances occurring almost daily in every direction that tends to indicate the progress of the century in all matters pertaining to the development of the human mind and human skill to accomplish hitherto unthought of wonders.

Whether it be some new automatic machine that apparently does all but talk; an astronomical discovery showing the infiniteness and perfection of the planetary system, an electrical device or the wonders of the modern antiseptic surgery, it is all the same—a part of our highly developed modern existence.

We are (as publishers) reminded of this upon receipt of the July issue of Cassier's Magazine, which will be known perhaps for many years to come as the "Niagara Power Number."

We are not going to attempt a description of it and we do not know how. It is fully three-quarters of an inch thick, weighs — contains nearly 000 pages of heavy-coated book paper and 400 of which are devoted to the choicest reading matter, with illustrations of Niagara Falls and its newly developed power plant from a mechanical and engineering standpoint. There must be hundreds of engravings, nearly all half tones of superior quality, and many of the advertisements are printed in colors

Readers and students of trade journals and magazines will be apt to conclude that this edition will mark an epoch and set the pace for competitors.

THE FOUNDRY has at different times called attention to the rapid strides made in the art of photography, and especially to growth of its use in the mechanical arts. We have before us the current issue of The American Journal of Photography and are more forcibly impressed than ever with the great advantages photography offers to the machine shop and foundry. The frontispiece of the June number is a very fine example of what can be done in the way of photographing machinery and reproducing in a simple manner any number of prints on blue print paper. The illustration mentioned shows very fine detail, and for all practical purposes is equal to a fine engraving, while the cost is infinitesimal.

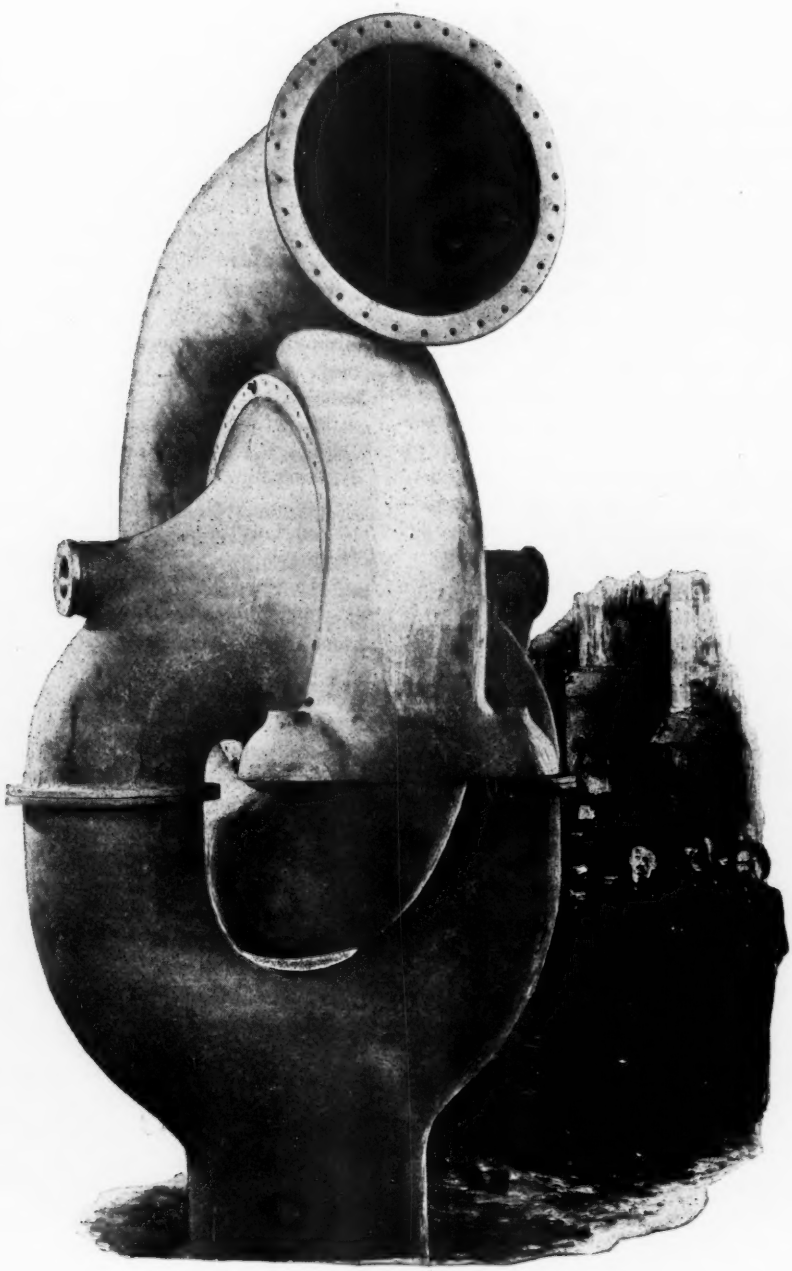
There is also a beautiful example of photogravure in "Little Curly Locks," two beautiful children with long curly hair, posed most artistically. The contents of the magazine are full of interest to the professional and the amateur, who wishes to keep "en-raporte" with the art, and Mr. McCollin is to be congratulated on his success in editing a high-class photographic journal.

American Journal of Photography, Philadelphia. Thos. H. McCollin & Co., publishers.

A Large Centrifugal Pump.

Through the kindness of the American Mashinist we reproduce a photograph of the main castings of one of three 42-inch centrifugal pumps, built by Moran Brothers Company, Seattle, Washington, for the new U. S. Dry Dock, at the Puget Sound Naval Station, Port Orchard, Wash. This dry dock is said to be the largest in this country, and is to be completed September 1st of this year. The machinery equipment for these dry docks was designed by the builders, and approved by the navy department.

The three pumps are alike, the dimension, 42 inches, being the diameter of the suction and discharge pipes. The photo was taekn in the foundry where the castings were made. It will be seen that the entire main body of the pump was cast in a single piece. It was made in loam, and swept up without patterns, except for the supporting lugs and the flange at the discharge. The plan of making insured an accurately fitting core, and consequently an even thickness of metal, the importance of which all will appreciate. The Y suction pipe was also swept up in loam, and the heads were made from a pattern parted to leave its own core.

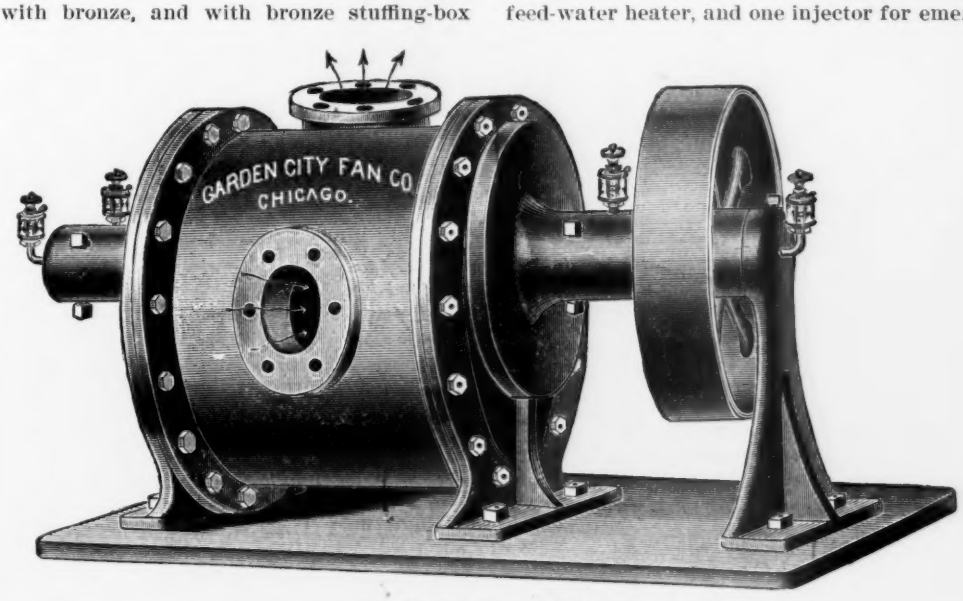


A Large Centrifugal Pump.

The three pumps are duplicates and each is driven by a vertical inverted cylinder, direct-acting steam engine, 28 inches by 24 inches stroke, the engines having piston valves and "Meyer" variable cut-offs. Each pump and its engine stand upon a common bed plate, the engine connecting directly to the pump shaft. The three pumps, with steam at 100 pounds at the boilers, are to have a mean discharge duty, collectively, of 110,000 gallons per minute, measured while pumping from mean high water to the sill level. The wheel of each pump is about 68 inches diameter mounted upon a hammered steel shaft running in bearings lined with bronze, and with bronze stuffing-box glands. Each pump has a steam ejector for exhausting the suction and charging the pump. It has also two double-gate valves, one for the suction and the other for the discharge. The gate on the discharge pipe is operated by a steam cylinder controlled by a hydraulic cylinder, so that it can be opened or closed as rapidly as may be desired by operating valves placed near the main engines. The suction valve is worked by hand. Each gate valve is provided with a starting screw.

The shafts of the engines are of hammered iron forged solid, with cranks and counterbalances. The pistons are cast of steel. The piston rods of forged steel are required to be so secured as to prevent turning both in the pistons and crossheads. The crossheads are of steel, and the guides of white metal. The connecting rods are of forged steel, and the eccentric straps of brass.

The steam will be supplied by six cylindrical horizontal return tubular boilers 6 feet diameter by 16 feet long, with 80 4-inch tubes to each. The specifications require the plates to have an ultimate tensile strength of 53,000 to 58,000 pounds per square inch, an elongation of 23 per cent in 8 inches, and a reduction of area of 50 per cent at fracture. The boilers are to be tested at 180 by water pressure. There is to be one feed pump and feed-water heater, and one injector for emergencis. It will be seen that the above constitutes quite an interesting plant, and we hope that before long our readers will be able to know a little more concerning it.

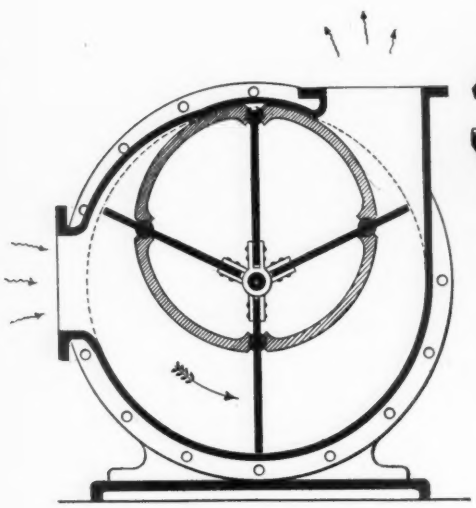


New Positive Pressure Blower.

New Positive Pressure Blower.

The operation of the new pressure blower of the Garden City Fan Co., of Chicago, is well indicated in the sectional cut given herewith. The perspective view shows the blower complete. The eccentric drum, as the sectional view shows, is mounted upon a central shaft and carries four blades, in suitable slots, that are always in positions radial to the outer shell, their outer edges touching the shell and their inner edges touching the cen-

tral shaft. As the drum revolves these blades passing out of it slide in and out, and the angles at which they stand to the periphery of the drum are constantly changing. The slots are kept closed and the air is kept from playing in and out of the drum by means of the semi-circular pieces shown in the slots upon both sides of the blades. The makers



Sectional View.

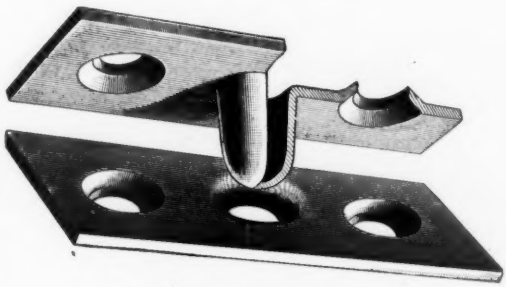
say that these blowers have been worked up to a pressure of 45 pounds per square inch. Compressors of this type should find an extensive field in the middle ground between the fan blower and the air compressor. They are made in ten sizes.

Should be Used on Every Two Part Pattern.

Our illustration shows a brass dowel for patterns and core boxes which is being extensively introduced by Messrs. Timmis & Clissold, of 21 Cherry street, Boundbrook, N. J.

Being stamped with dies, they are exactly alike, therefore interchangeable. This is of great importance where a main pattern is fitted with loose pieces which may have to be located in various positions.

The great advantage of brass dowels is that they are non-corrosive and do not get clogged with varnish nor swell when wet or become loose when stored away in a dry room. Neither will the careless molder reduce the pin in size with his knife or ream out the hole as is so often done with wooden pine, for the reason that they always fit and correct joints on castings are a result. The dowels have met favor wherever they have been tried and are in use in over 700 shops in this country. The goods are offered at a low price, and taking everything into consideration, are much cheaper than



gooden pegs in the long run, as they perform a more satisfactory service in every way.

The Machine Shop as an Educator of Molders.

H. HANSEN.

The door which separates the foundry from the machine shop closes in many places too tightly, the hinges need oiling, the springs readjusting, so that we may no longer hear that sharp thud when one department must step over the boundary line into the domains of the other.

There is a current belief among many molders that the machinist looks down upon them, regards them as inferior in the standing of mechanics, has no use for them, in fact, gives them the cold shoulder. In nearly every case this is wholly imaginary, but the molder is apt to be very imaginative when the foreman winks his ear at him and calls him over to the machine shop to listen to a very short but impressive lecture upon some faulty casting that is going to be expressed out to the rear of the foundry. The machinist does not as a rule take a vacation while the molder is having the riot act read to him, but remains a silent witness to the process of turning a molder down to size, and some get cut down so low that they have to go to a healthier resort to take on stock.

Do we not all dislike publicity in affairs considered private? If we must undergo

some agony of mind and listen to words that we would sooner had remained unsaid, what can intensify this punishment more than to have an outsider witness the whole proceeding? Our shopmates soon catch some of the details of the inquisition, and the stray remarks which they drop find no easy resting place anywhere in our system. Does the molder under such circumstances regard the machinist as a friend, because he remains close to him? Far from it; let him be anywhere else but near by. The molder imagines that the machinist is greatly enjoying the programme presented; often he believes that the machinist reports faults just to get a chance to view a free show, and when the molder returns towards the foundry he has got no kindly feeling for anyone engaged in that trade. He slams that door hard and thinks for a while over the question, which has never been solved, viz, how can a molder make trouble for a machinist without making trouble for himself?

When someone else is paying the fiddler, it becomes easy to dance. We all like to extract what humorous parts we can from anybody's serious predicaments, but the machinist goes no further than others in this respect. Occurrences, no matter how solemn or even serious they may be, are apt to contain a good percentage of mirth, and this can not always be controlled. You may offend most people by laughing at a time when they can not. There is but small chance for having the machinist brought into the foundry to have judgment passed on him. Some molders manage to get into the machine shop court quite frequently to express their fond regrets that things are not otherwise. The onesided affair of administering justice does not promote the cordiality that should exist between two trades so closely related.

The foundry foreman is liable to be too anxious to remove the molder to the machine shop for trial. He receives most of his complaints from that department himself for hard iron, crooked castings, short stock, etc., so when the machinist runs his tool into a cavity, caused by neglect in feeding, or finds a core placed out of center, he is liable to apply a pretty strong dose of moral persuasiveness to the molder as a balm for his own injured feelings and shortcomings, just to show people at large that he alone is not responsible for defects.

The rank and file of machinists have in the past received a superior education to that which has been accorded the molder. The very trade has in itself furnished them with many mechanical truths, which everybody should know, but which have been excluded from the molder, because there has been nothing to force their observation upon him. Consequently the machinist has been able to converse on matters of which the molder was entirely lacking in knowledge. A mechanic usually seeks the company of his equals or superiors, very seldom does he condescend to voluntarily discuss questions with those below himself in intelligence, and a machinist will consider it as a mutual benefit to exchange ideas with a molder not absolutely ignorant. We often note with disdain some of the questions asked by strangers in the foundry, to which we offer an outrageous reply, yet some of the questions asked by the molder in the machine shop are equally absurd, but this gentleman will now consider himself insulted if offered some explanation beyond the limit of his digestive powers.

It is an unfortunate fact that molders are not better acquainted with the machine shop and machines. The total extent of many molders' familiarity with the machine shop is entirely geographical, and is acquired in the search for a good hiding place to locate a bottle. Many a casting with a big N. G. can be charged to a want of information in regard to what it was intended for or the position it would occupy when assembled. Many molders will probably say that they have no time to monkey around the machine shop, yet nearly every foundry has a few who find several chances during the week to look through this interesting chamber. At recess while some are playing ball, others watching them and spinning yarns, these are looking through the machine shop, inspecting castings here and there being finished. At the end of the year who are the best molders, those that played ball or those that investigated the machine shop? I say, by far the latter. If a pattern is handed to them, and a thread is to be cut in some parts of the casting, they will see that these portions are cast solid, without having a bad casting brought to them first to remind them of it. They will avoid using chaplets, if possible, they will not put a name-plate on upside down.

They know what parts are to be finished and must be clean, without the foreman telling them, when they have the mold ready, to shake it out and make it the other way up. They will see that cores are put in right to give the desired stock of metal all around.

These men may have obtained this information in their own time, while others were attending some amusement. Give them, however, the credit of being better for it, for these are the ones that take away some of the cares of a foundry foreman, and make this world not altogether one of thorns for him, for what foreman ever could remember to tell a molder of all the difficulties to be guarded against in a great number of patterns.

Of the molders who do enter the machine shop, we find some there for an entirely different purpose than what is here suggested. These are trying to find out how things work, make the wheels go around, and they are in their right element. There is a distinction here; these are visitors, pure and simple, attracted by anything that is a novelty. The first are investigators, seekers after knowledge that will help them in the foundry. Don't confound them. A molder may be a dictionary of machines, be an ideal engineer even, and yet not know how to make an acceptable piston head.

As an educator of molders, as a help to do good work, no institution is more worthy of regular attendance than the machine shop. Go there voluntarily. It may be a fault-finder, but avoid this by becoming so well acquainted with it and its needs, that you leave no faults to find.

Keep's Cooling Curves.

W. J. KEEP.

At the meeting of the American Society of Mechanical Engineers which met in Detroit the last week in June, the committee on methods of testing recounted the work done during the past six months in three papers by W. J. Keep. The first was a description of the details of mixing the iron and making the testbars.

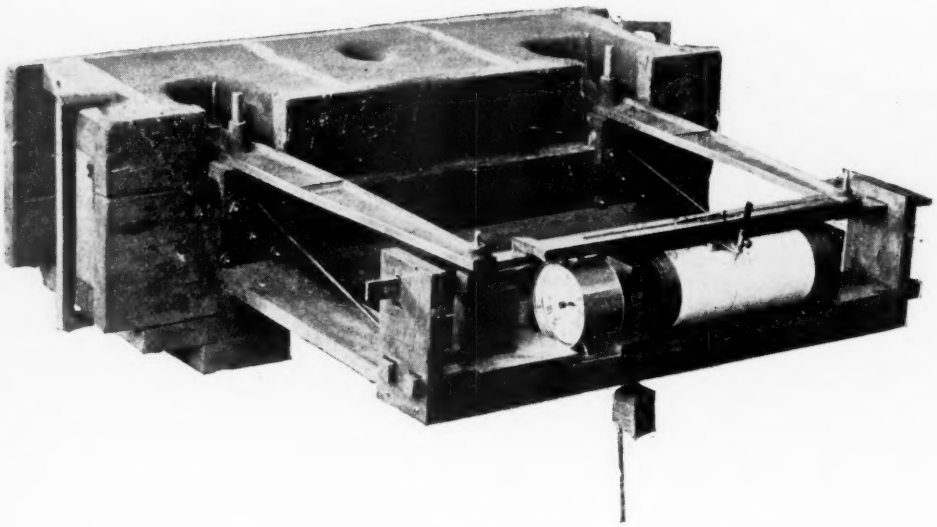


Fig. 1.

Keep's Autographic Machine for Testing Shrinkage.

The paper that possessed the greatest interest was "Keep's Cooling Curves." This was a new departure in the study of iron. Mr. Keep made an autographic machine which was attached to a mold of a test bar one inch square and two feet long. Fig. 1 shows this machine. When the mold was filled with melted iron and the iron became solid, a diagram was made on the revolving drum showing every motion of the ends of the test bar. When this machine was placed upon the mold it was expected to make a curve showing the shrinkage of the bar. It was the opinion of some that when the iron became solid it would expand and

after that would shrink. To the surprise of all it began to expand after the bar was solid. Fig. 2 shows the curve made by the testbar. In five minutes the expansion became slower, and the curve crossed to the right of the line on which the curve started. At the end of seven minutes this solid testbar began to expand faster and the curve touched the perpendicular line again. At eight minutes the expansion became less rapid and it seemed as though the expansion had ceased, but at the end of ten minutes the pencil swept clear to the left, the bar expanding more than twice as much as it had done before, and this expansion continued until more than fifteen minutes from the time the bar was poured. After this the expansion ceased, and the curve swung to the right, showing simply shrinkage. Here were three distinct increases of expansion of a solid testbar while cooling in a sand mold. Mr. Keep named them the first, second and third expansion. In his paper on shrinkage at the December meeting, which was reported in THE FOUNDRY January 10, he showed that a variation in shrinkage was caused by varying the silicon in an iron mixture. The more silicon the less shrinkage and the greater softness, but why the shrinkage was less was not so easily told. This cooling curve tells the story. The testbar was shrinking all the time after the iron entered the mold, but at the same time for fifteen minutes it expanded so fast that it over-balanced the shrinkage, and the bar actually grew longer than the mold. The final shrinkage is the difference between the length of the mold and the length of the bar when cold, but this bar did not begin to grow shorter until seventeen minutes after it began to cool. The part of the shrinkage that occurred while the testbar was expanding was not measured. The portion that was measured was the shrinkage of a bar beginning after it had been cooling and shrinking seventeen minutes. Fig. 2 only shows the curve up to the time that shrinkage commenced, but it took seven hours for the bar to get cold. This part of the curve is of no interest and is not shown. To lessen the shrinkage of cast iron silicon is added to increase the expansion. A study of a large number of curves shows that the third expansion was caused by a final rearrangement, and opening up of the crystals, which increased the bulk of the casting.

At the right of the curve, made by the machine, in Fig. 2, is shown the fracture of eighteen testbars one inch square. These eighteen bars, numbered from 18 to 36, were poured at the same time as the testbar from

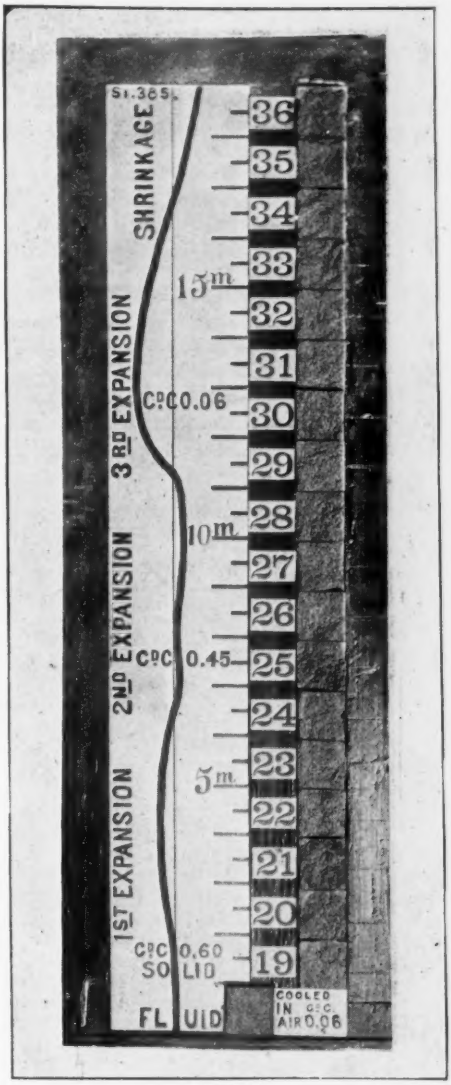


Fig. 2.
Specimen Curve made by Machine.

which the curve was made, therefore the same changes were occurring in each of these bars as in the one to which the machine was attached. Each bar would have recorded the same curve. By breaking one

of these bars at the end of each minute, and by throwing it into a barrel filled with ice and water, we shall find as nearly as is possible, the state of the iron at each part of the curve.

This gives only the faintest idea of the state of the iron at the time it was thrown into the ice water, because gray cast iron will change from a hard ungranular condition into soft gray iron in a few seconds of time. It is impossible to chill such iron. The first bar (19) was solid in one and one-half minutes, but broke with its own weight,

W. J. KEEP.

W. J. Keep learned the trade of machinist at the Globe Iron Works, Cleveland, and graduated as a civil engineer at Union College, Schenectady. He at once engaged in the manufacture of stoves in Troy, N. Y., and of late years in Detroit, Mich. The irons used in the west were so different from those used in the east that he began a series of investigations which have been of great benefit to foundrymen. His most brilliant discovery is "Keep's Cooling Curves."

Mr. Keep is an honorary member of the Foundrymen's Association, a member of the American Association for the Advancement of Science, the American Institute of Mining Engineers, the Franklin Institute, the American Society of Mechanical Engineers, the Iron & Steel Institute (London), and is a member of the committee on methods of testing of the Society of Mechanical Engineers.

but the casting taken from the water is gray and crystalline, and does not differ much from the others. Bars 19, 25 and 30 were selected for analysis. The first contained 0.60 combined carbon, bar 25 contained 0.45, but bar 30 only contained 0.06; 19 and 25 could not be drilled, while 30 was perfectly soft. The bar shown at the left of bar 19 is one of the bars that was not thrown into the water and its combined carbon is 0.06, the same as bar 30. This shows that the iron was hard during the first and second expansions, and that during the first part of the third expansion the iron turned soft and the carbon turned to graphite. If the testbar is heated in a muffle to a bright red heat and placed on the machine, the curve of the third expansion will be again produced, showing that the temperature for annealing cast iron should be the same as that of the third expansian.

Tin, lead and zinc do not expand, but give a simple parabolic shrinkage curve.

A curve from a reheated bar of rolled steel will show the quality of the metal.

The discovery of these curves furnishes an answer to most questions regarding the physical changes that take place during the cooling of a casting, and they show the character of the metal.

Thus far no curve has been obtained from a bar of ice, but curves from plaster of Paris have shown the best manner and proportions for mixing to produce the coldest mold with the least expansion.

In foundry practice a mold can be made in fifteen minutes, and the metal can be poured as soon as the iron begins to come from the cupola. A curve shows in fifteen minutes whether the iron contains as much silicon as is best, and there is time to change the mixture if necessary.

Mr. Keep's other paper was "Transverse Strength of Cast Iron." Some of our readers would like to know what results were obtained with round bars cast flat and on end, but the paper treats only of square bars. We heard, however, that round bars were made with each of the nineteen series, and that these have been tested at Columbia College, and that a report may be expected next December. The tensile strength of a large number of bars is being determined at the same place.

We reproduce only one of Mr. Keep's

charts (Fig. 3), which illustrates the conclusions arrived at, which will be a surprise to many of our readers. Mr. Keep states that this chart is compiled from actual tests of a large number of tests of bars made like ordinary castings. He states that the opinions held by most writers and by most chemists must have had their origin in a study of just such castings as this committee has made, and he proceeds to show from these tests how such opinions originated, and by the same test proves the incorrectness of many of these opinions, and he accepts only such conclusions as agree with ordinary shop experience.

This chart shows that each increase of silicon increases the strength of small castings, and decreases the strength of large castings. This causes the strength curves of the chart to cross each other at near the record of a bar one inch square. This shows that the record of a one-inch bar is more nearly uniform than that of any other size; in other words, it gives the same record for a mixture containing 1.00 per cent of silicon and one containing 3.50 per cent. While

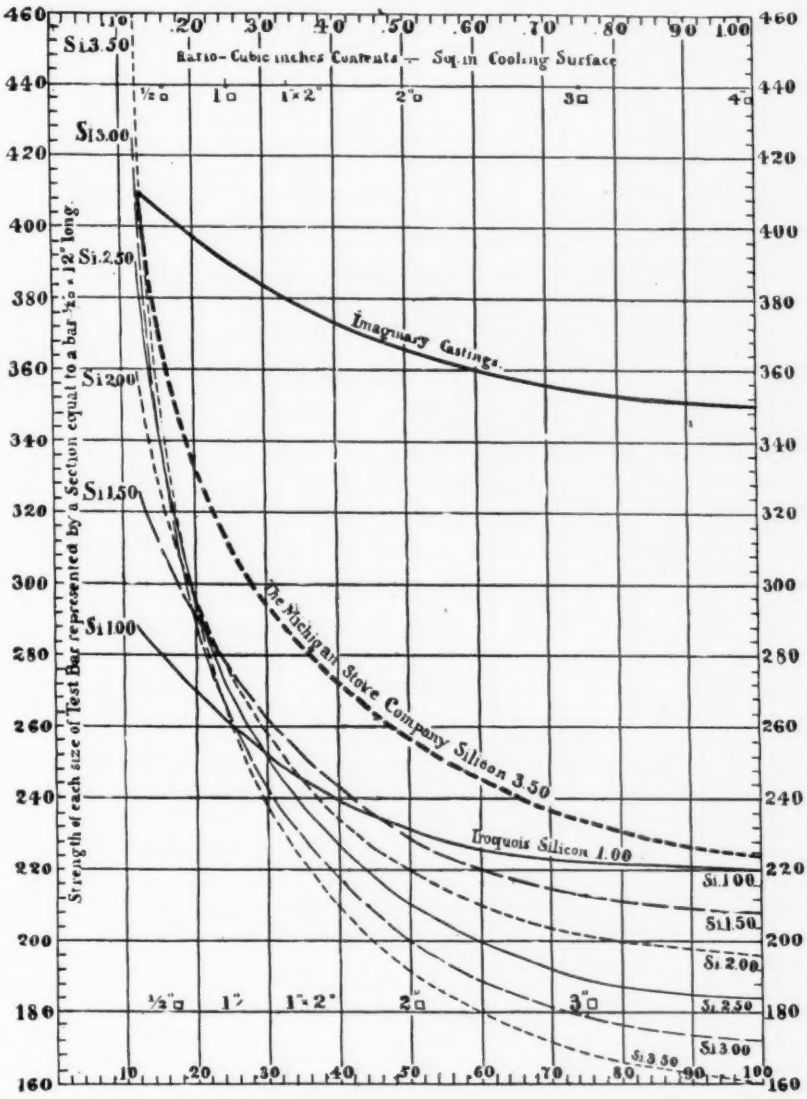


Fig. 3.

the fact of the uniformity of the record of a one-inch bar led to its general use, yet it does not help the founder. The trouble has been that cast iron was supposed to be a definite material, but Mr. Keep's paper shows that its quality varies by changing the silicon, or by making the grain finer or coarser. The closer the grain the stronger the casting, and vice versa. The most common method of making a casting close in grain is to use pig iron and scrap that is low in silicon, because such iron has a close grain, but it will be likely to make hard castings. To make a soft casting the silicon must be increased, and the common way to get a close grain is to select pig iron that has a close grain and yet contains enough silicon. Such pig iron is the cheapest as well as the best for strong castings. The curve marked "Michigan Stove Company" has been made strong in this way. Another way is to place 100 pounds of clean cast iron borings or drillings in a wooden box with the cover nailed on, and charge this with the pig iron. This will close the grain and leave the castings soft. A curve not shown on this chart, but strengthened in this way, was ten pounds stronger throughout its length than the one just mentioned. If it were possible to keep on closing the grain in large castings, and not change the grain of small castings, we would finally reach the strength indicated by the curve marked "Ideal Casting." We cannot do justice to Mr. Keep's papers in the space that we can allow in this issue, but if any of our readers have not seen the full text, we have no doubt they can obtain a copy by addressing Mr. Keep himself at Detroit.

Foundry Heating and Ventilating.

A modern and efficient method of foundry heating and ventilating may be of interest to THE FOUNDRY readers who have had this problem to solve and to those who are yet in a quandary over this matter, it may prove instructive.

It was our pleasure the past winter to inspect a foundry whose system of heating and ventilating is the best we have yet seen. The foundry was somewhat larger than the ordinary, being about 80x250 feet. It was equipped with the Buffalo Forge Co.'s heating and ventilating apparatus, which was placed in an adjoining building on a level with the second floor, out of the way, and occupying very little space.

This apparatus consisted of a steel plate fan with a direct connected vertical engine which possesses many advantages over a belt-driven fan, as it can be run at any time independently of other power, and the volume and pressure of air can easily be changed to suit all requirements.

The hot blast heater was arranged in sections, each consisting of four row coils, securely fastened into the manifold or base. These manifolds have three distinct compartments of ample area for the special purpose they are intended to serve, the steam supply is admitted to the manifold through a direct pipe, passing up through the vertical coils, down the opposite side, the water of condensation flowing out through another channel into a steam trap, the arrangement positively assuring dry steam at all times.

The heater was encased in a neat steel case with a door on the side that the coils might be inspected and affording easy access for necessary repairs. The heater is connected with the inlet of the fan, the air being drawn in over the heated coils, warming it to the desired temperature and discharging it into the foundry.

One remarkable feature noticeable was the absence of any piping whatever, the heated air being blown directly into space from the outlet of the fan, circulating throughout the room by the constant operation of the fan.

The day we inspected this apparatus was extremely cold, and yet everyone seemed comfortable, all the windows in the foundry were clear of frost, and there was not a variation of over 2 degrees in any part of the foundry.

In the summer time this apparatus is used for ventilation, the cold air being blown into the room by the fan, and even at "pouring off" time during the hot July weather the foundry temperature is not excessive and no one suffers from the heat.

The Walburn-Swensen Co., of Chicago, Ill., have recently added one hundred men to their force and are running day and night. Sugar and mining machinery are their specialties, although the manufacture all kinds of heavy foundry work.

Pittsburg and Vicinity.

The strong upward tendency in prices of iron and steel continues. The advance in rails, billets, bar and shapes continues and the prospects are that the price of billets will still go higher. There has been large orders for structural material placed within the past few weeks, and there are still a number outstanding. As things now look, there are higher quotations at our doors, but there is also a feeling that the trade will enter the danger zone, if the present momentum carry prices much higher.

The course of the foundry market in the Pittsburg district for the first six months of the year is shown by the following table:

Jan.	4	$11 @11.25
"	11	11 @11.25
"	18	11 @11.25
Feb.	1	11 @11.25
"	8	10.50@10.75
"	15	10.50@10.75
"	22	10.50@10.75
March	1	10.50@10.75
"	8	10.50@10.75
"	15	10.50@10.75
"	22	10.50@10.75
"	29	10.50@10.75
April	5	10.50@10.75
"	12	10.50@10.75
"	19	10.50@10.75
"	26	10.50@10.75
May	3	10.50@10.75
"	10	10.50@10.75
"	17	10.50@10.75
"	24	11 @11.25
"	31	11 @11.25
June	7	11 @11.50
"	14	11.75@12
"	21	12 @12.50
"	28	12 @12.50

In the pig iron line, Bessemer showed about the only movement apparent from January until April, although the better grade of foundry irons grew stiffer. The greater change in prices took place in June, when all branches of the market showed an advance. The circumstances surrounding the market at the present time seem to indicate that the advanced prices are to be maintained and that in some lines higher prices may be expected. Present prices are as follows:

No. 1 Foundry	$12.25@12.75
No. 2 Foundry	11.50@11.75
Bessemer	13.00@13.25
Charcoal foundry, No. 1	16.75@17.25
Charcoal foundry, No. 2	15.75@16.25
Charcoal coldblast	22.75@23.50

Rolling Mill Castings.—There is some demand going, but not enough to keep foundries running to near their full capacity. Prices are:

	Cents per lb.
Spur and bevel wheels, small	3 to 4
Chilled rolls, up to 12" diameter	3¾
Chilled rolls, over 12" diameter	3¼
Sand and homogeneous steel rolls and pinions up to 12" diameter	2½
Over 12" diameter	2
V-tooth pinions, additional	¼
Housen and rolling mill castings not otherwise specified	2
Spindles and coupling boxes	1¾
Squeezer castings	2
Squeeezr pinions and wheels	2¼
Spur and bevel wheels, large	2½

Copper.—This metal is in fairly good demand, while prices are being held firmly at 10½c for casting.

Pig Tin.—The marekt is in a fairly active state, with prices ruling at 15@16c for small quantities.

Pig Lead.—This market is very quiet, the demand being slow with prices ruling as follows: *Carload lots*, $3.35; *smaller quantities*, $3.50@3.60.

The Frankford Steel Forge Works, in Ellwood, will soon have its plant completed, when operations are to begin at once. All the machinery is in position or under way. The plant is supplied with three large hammers ,the largest of which weighs 100,000 pounds.

Among the recent sales of the Fischer Foundry and Machine Company of its automatic engines are mentioned one 350 horsepower to the Sterling Steel Company, Pittsburg, one 100 horse-power to the Webster Fuel Gas and Coal Company; two 200 horsepower tandem compound to the Lake Side Lock and Street Railway Company, of Mt. Clemens, Mich.; one 75 horse-power to the Pittsburg Bridge Company; one 300 horsepower to the Pittsburg and Suburban Street Railway Company.

The Totten & Hogg Iron and Steel Foundry Company, manufacturers of rolling mill engines, rolling mills and tin mills, has just received a second order from the National

Tin Plate Company, Anderson, Ind., for two 24-inch hot mills and two 20-inch cold mills for the new plant which the company is now building at Anderson.

The Kensington (Pa.) Foundry Company is enlarging its plant at that place. Foundations have been begun for an extension 40x75 feet, and it will be pushed rapidly to completion.

Among the Foundries.

The Advance Foundry, of Minneapolis, is now in operation.

James P. Milligan's new foundry at Pottstown, Pa., is running.

Geo. Clark is to build a large new foundry at Kalamazoo, Mich.

Koehler Bros.' foundry, New Albany, Ind., was burned July 4th.

George & Tweedle's foundry at Constantine, Mich., was burned $1,300 worth July 2.

Abendroth Gros., at Port Charles, N. Y., have voluntarily raised wages 10 per cent.

The Rocky Hill Foundry Co. is a new corporation at Rocky Hill, Conn.

Mr. Pharr is building a foundry at Dilworth, N. C.

A receiver has been appointed for the East End Foundry at Cleveland, O.

The United States Glass Company will erect a foundry at Glassport, Pa., to make their molds for table ware, lamps, etc.

The foundry of the Hopedale Machine Co., Hopedale, Mass., will be enlarged by the addition of 250x68 feet.

T. J. Lockwood, of Farmington, Minn., has purchased the foundry of P. B. Lamoreaux at Owatowa, Minn.

The Monitor Manufacturing Company, at St. Louis Park, Minn., will open September 1st.

The Minnesota Threshing Machine Co., at Hopkins, Minn., is very busy and working over time.

The Valley Iron Works, of St. Paul, recently burned out, are now located in their new shop.

The American Hoist and Derrick Co., of St. Paul, Minn., have recently made a heavy shipment to Christiana, Norway.

A receiver has been applied for by some of the stockholders of the Queen City Foundry Co., Cincinnati, O.

Messrs. M. Schwartz & Co. have purchased the historic plant known as Leeds Foundry at New Orleans, La.

Young & Schlough's old established foundry at Easton, Pa., was sold at sheriff's sale June 29th.

An effort is being made to reorganize the Radford Pipe & Foundry Co. by Cincinnati parties interested.

John W. Woonde, of Philadelphia, has purchased the foundry at Oxford, Pa., and will carry on the business.

The wheel foundry men of the Pennsylvania Railroad shops, at Altoona, Pa., had the 12½ per cent cut in their wages restored on June 27th. The foundry is overcrowded with orders.

Albuquerque Foundry and Machine Co., at Albuquerque, N. M., is said to be the most important manufacturing plant in the territory. From 35 to 45 men are employed and it has a capacity of 200 tons of castings a month.

All of the employes of the Illinois Steel Company, at Joliet, Ill., save those being paid on the sliding scale, have had their wages advanced 10 per cent. This will be a good example for other mills and will liekly be widely followed.

A large electric crane in the foundry of the Edgar Thomson Steel plant at Pittsburg "ran away" June 19. Someone turned on the power and the crane proceeded to demolish itself and the building forthwith and did plenty of damage to both.

Matthew Boulton and James Watt's Soho foundry at Birmingham, where Watt worked out his idea of the steam engine, after an existence of 133 years is now idle, and will soon be broken up and dismantled. At one time it employed 4,000 men, but its business died away, and when it closed its doors it had only 400.

New Foundry Enterprise.

Messrs. Brown & Van Tuyle will build a foundry at Wayland, N. Y.

N. N. Hills will build a foundry at East Hampton, Mass.

The Kensington Foundry Co. at Greensbury, Pa., are enlarging their works.

The Flemington Iron Foundry at Flemington, N. J., is being enlarged.

James P. Milligan is rebuilding his foundry recently burned at Pottstown, Pa.

The Hopedale Foundry at Hopedale, Mass., will enlarge.

The De La Vergne Refrigerating Co., of New York, will erect a foundry.

Henry McGregor, of Concord, N. H., expects to be manager of a new foundry about to be opened at Ayer, Mass.

The Fox Machine Co., at Grand Rapids, Mich., are enlarging their works, foundry included.

Messrs. Foran & Abenroth have commenced an adiition to their foundry at Flemington, N. J.

The foundry of George & Tweedale at Constantine, Mich., was damaged $1,000 worth by fire une 3d.

Terstegge, Gohman & Co. have commenced the rebuilding of their works at New Albany, Ind., recently destroyed by fire.

The Hartford Woven Wire Mattress Co., at Hartford, Conn., will build an addition 100x54 to their foundry.

Struthers, Wells & Co. will build a new foundry at Warren, Pa., 130x70 feet. The Shiffler Bridge Co., of Pittsburg, will do the work.

Palmer Bros. will build immediately a new foundry at Bell Plains, Ia. It will be a trifle irregular in shape owing to the location of lot, but will be 72x98x88x90 feet.

The Union Brass & Metal Manufacturing Co., of St. Paul, Minn., send us their last catalogue. They are evidently very much in the brass business and make a large line of plumbers' supplies.

New Incorporations.

Erie Foundry Co., Rochester, N. Y., capital $5,500.

Lafayette Foundry Co., St. Louis, Mo., capital $10,000.

Fire Fiend.

I. H. Small's foundry, San Francisco, Cal., was destroyed by fire June 27.

Bisch Bros.' foundry at Crawfordsville, Ind., was totally destroyed by fire June 15. Loss, $6,000.

Fire damaged Smith & Loughlin's foundry in Brooklyn, N. Y., to the extent of $3,000 June 17.

The foundry of the Delphos Foundry & Furnace Co., at Delphos, O., was destroyed by fire June 13.

McKinney's foundry at Tottenham, Ont., started a fire that not only consumed the foundry but half of the town June 18th.

Ireland & Hughes, iron folnders at Pittsburg, Pa., had their foundry and contents destroyed by fire June 19th. Loss $8,000.

Obituary.

Alton J. Shaw, President of the Shaw Electric Company, is dead, having passed away suddenly June 22.

The cause of his death was peritonitis, and his hundreds of friends in every part of America will mourn his loss.

ALTON J. SHAW.

BRIEF BIOGRAPHICAL SKETCH.

Mr. Shaw, who was at the time of his death known as one of the representative business men and manufacturers of Western Michigan, was born in Buckfield, Oxford County, Maine, in 1858, and was therefore 37 years old. His father, who was a well-todo shoe contractor and manufacturer, gave his son the advantages of the best schools. The boy was a natural born mechanic and devoted nearly all his spare time to experiments in natural science and mechanics. He entered college at 16, intending first to obtain a classical education, but impatient

to begin his life work, soon transferred to the Maine State College, from which he was graduated in the mechanical engineering course in the class of '79.

During much of his senior and junior years he was employed in outside professional work and brought out several mnior inventions. After graduating he entered the employ of the Chandler Water Motor Co., of Lewiston, Me., as mechanical engineer, remaining there three years.

In 1882 Mr. Shaw engaged in business for himself and then was in the employ of the noted Eastern manufacturers, such as the Yale & Towne Mnfg. Co., of Stamford, Conn. Coming West he engaged with the E. P. Allis Co., of Milwaukee, and it was while here an accident occurred which put him in position to give scope to his inventive ability.

A large power traveling crane in the foundry gave way on account of structural weakness. Mr. Shaw was assigned to the task of designing a crane to take the place of this one, and the result was the Shaw electric crane, the first of its kind. It attracted great attention from engineers and manufacturers and after the second one was built Mr. Shaw engaged in the crane business for himself.

The business became too large for him to handle and while looking about the officers of the Muskegon Improvement Co., at the time of the Heights boom, induced him to come to Muskegon. The result was the big shops of the Shaw Company as they stand to-day and in which the well known firm of Manning, Maxwell & Moore, of New York, are interested.

Horace Felton, formerly a resident of Portland, Me., died in Boston June 14. He moved to Boston in 1852 and had carried on a large machine shop and foundry.

Lafayette Gilbert, proprietor of the foundry at Livingston Manor, N. Y., was killed in a runaway accident June 28th.

Robert Lea, for more than forty years a prominent machine builder and foundryman of Pittsburg, died suddenly at his home in Allegheny, Pa., on June 18, aged 80 years. Mr. Lea retired from business some six years ago. He furnished the machinery for many steamboats in the Pitssburg coal trade.

William Jones, foreman of the Gemmel foundry at Sharpesville, Pa., fell from a scaffold 100 feet to the ground and was instantly killed June 22.

David Holman, lessee of the Miffin foundry at Miffintown, Pa., died suddenly of heart failure June 22.

Henry Johnson, proprietor of the Franklin Iron Works, Reading, Pa., died on July 5, of gangrene, aged 66 years. Mr. Johnson had been engaged in the iron business all his life, and succeeded his father, Adam Johnson, in the coutrol of the Franklin Works. He was widely known among the trade in Eastern Pennsylvania.

George Flower, of the firm of James Flowers & Bros., one of the oldest and best known manufacturers of Detroit, Mich., died at his residence in that city on June 30. He was born in Winchester, England, October 17, 1825, and migrated to Detroit in 1847. For about five years he was employed on the Michigan Central Railroad, and in 1852, in company with his two brothers, James and Thomas, established himself in business as a founder and machinist.

NOTICE.

Advertisements Inserted under this head for 25 cents a line each Insertion.

FOR SALE.—Foundry and machine shop; buildings new, brick, slate roof, 40x60 and 30x80; 1½ acres ground; splendid opportunity for practical man with small capital. Address Box 584, Coshocton, O.

FOR SALE.—Foundry and machine shop, located in one of the best inland cities of Central Wisconsin; a first-class agricultural and timber country; well equipped with first-class tools suited to the trade. Here is a good chance for a mechanic of limited means, as the property will be sold on easy terms. For full particulars, address W. W. TAPLIN, Neillsville, Wis.

A FIRST-CLASS foundry foreman and general molder with extensive experience in handling work and men, mixing and melting metals and general foundry knowledge, wishes situation. Strictly temperate, with highest testimonials as to character, execution, ability, etc.; American, age 38. Address "PRACTICAL," care Foundry Publishing Co.

Wanted—Position as manager of small foundry and machine shop by young man of experience, or might rent shop in good locality. A. L. P. C., Foundry.

A first-class foundryman, who has had charge of two large foundries, making castings for enameling, and a practical enameler, would like to communicate with capitalists with a view to manufacturing this class of goods. Bath tubs, sinks, plumbers' goods, etc. Address Enamel, Foundry Publishing Co., Detroit, Mich.

The Plumbago Club.

Somehow or other the members of the Plumbago Club seem to have suddenly developed a great fondness for holding their sessions at the same time and place chosen by organizations that are likely to bring together anyone interested in the foundry business. Those who attended the meeting of the Stove Manufacturers' Association in May were reported as having enjoyed themselves so much that President Hibbs found himself being urged by the members to have the June session held in Detroit at the same time as the American Society of Mechanical Engineers held their summer meeting. Whether or not the president's judgment was in any way influenced by the reports that were sent out by the entertainment committee concerning the number of luncheons, socials, boat rides, fish suppers, receptions, etc., that had been provided for the guests is something that can perhaps be decided by those who know him best, but at all events he not only issued the call but decided to come himself and bring along his full dress suit.

He came and was on hand the first day to welcome his brother members, and busied himself seeing that they all received the necessary tickets, badges, etc., that should entitle them to the benefits of the entire program.

With his customary shrewdness he had secured the best rooms at the Russell House at half rates for himself upon presentation to the clerk with that grandiloquent manner all admire and none can imitate of a card containing the following:

JOSEPH S. HIBBS,

President Plumbago Club,

U. S.

The clerk seemed about to ask a question as he noticed that Mr. Hibbs simply put down his residence as the United States, but recollected himself in time to prevent any awkward mistakes, evidently thinking that Detroit's best known hotel was now about to entertain a gentleman more famous probably than Grover Cleveland, Bill Nye or he had heard the name before he called three of his smartest boys to convey the gentleman's baggage to a handsome suite on the first floor, facing the City Hall on one side and the dining-room on the other. After seeing to the comfort of all his friends he began to look about and make enquiries concerning a suitable place in which to hold their session, being interrupted somewhat by the visitors in the lobby, who mistook him for one of the chief engineers of the United States Navy in attendance upon the convention, and beseiged him with questions of various kinds.

Hearing that the engineers would hold their sessions in the Y. M. C. A. building the president felt that an ordinary place under the circumstances would be hardly appropriate for the Plumbago Club. Mr. Millns thought they might secure a church, and the idea seemed to impress the president at once as being just the thing. He said he had considerable experience in church and choir matters, and would call on some of his theological friends immediately and find out if it were possible to make any suitable arrangements.

Mr. Bullock objected to anything of the sort by saying that churches were all well enough in their places, but inappropriate for meetings like those of the Plumbago Club. Mr. Hill, for instance, might forget for the moment where he was "at" and commence to use some expressions not ordinarily heard in religious edifices, and as he was naturally of a very vehement and positive disposition it might be unpleasant all round.

This view of the case seemed to be taken by those present, and as Mr. Hill fortunately was in the "refreshment room" he did not know that thoughts of what he might do decided the president to keep clear of anything in the way of a building devoted to religious purposes. As all the hotel parlors seemed to be engaged Mr. Hibbs seemed lost for a moment—but only a moment—when he started for the door and took the direction of the City Hall.

Here he enquired the way of Mayor Pingree's private office, and presenting his card to the attendant sat down to wait and examine the furniture, etc. He was not kept long in suspense, however. The mayor was busy with a delegation from Boston, who had come to enquire concerning his potato scheme, but upon learning who wished to

see him excused himself and came forward eagerly to meet the president of the Plumbago Club.

Upon learning his mission, viz.: that the club had honored Detroit by paying it a visit and desired to secure a meeting place, the mayor seemed greatly impressed and immediately tendered the use of the City Hall and suggested the council room as a most excellent place.

The president thanked him cordially, taking care not to give the impression that he was surprised or that the honor was unusual, and after assuring the mayor that his fame as an agriculturalist and as an enemy to every form of municipal rascality was known even in Philadelphia, he withdrew in triumph. That evening the club was duly called to order with the president on the throne.

After the minutes of the previous session had been read the secretary read the following letter:

Springfield, O., June 1st, 1895.

H. F. Frohman, Esq.:

Dear Sir—We notice with pleasure that the leading representative foundry facing men of the country have formed a club for the purpose, among other things, of uniting to elevate the standing of the business and taking such measures as will cause its members to be treated with more respect by the foundry fraternity. While we have never had much cause to complain except in the instance we intend to refer to we would most respectfully suggest that you should be careful that none are admitted to membership unless they possess a spotless reputation for truth and honorable dealing.

We were called upon one day a few years ago by a smooth gentleman, who said he had something new to show us in the way of a facing. Always on the lookout for improvements we listened. It appeared that what he had to sell was something he called "talk" or "talc," we did know which way he spelled it at the time. We only remember that he said it was "white," was sticky-smooth-soapy and shiny," and would change the appearance of anything with which it came into contact. We believed him then, and he "talced" or "talked" us into buying half a carload—before the price went up—as the firm he was with "controlled the only mine in the world," "and its wonderful merits" as a facing were as yet a secret."

If it had only proved half as "white," "smooth, sticky, soapy and shiny" as the man who sold it we would not complain and be writing this letter; neither would our foundry foreman carry a loaded six-shooter, but it failed in all particulars, and while we have since heard this gentleman's name was White we are not inclined to believe anything in connection with him or his goods, and as he has never since shown up here we take this opportunity of drawing your attention to the business methods pursued by some of those in your line.

We think that you should use all honorable methods to compel every dealer in foundry supplies or equipments to either be scrupulously honest or else leave the business. If you can advise us where the gentleman can be found who swindled us so disgracefully we will start the sheriff after him immediately.

Yours respectfully,

WARDER, BUSHNELL & GLAESNER.

Mr. Hill could hardly keep his seat during the reading of this epistle, and at its conclusion sprang to his feet and waving his arms excitedly declared: "That's him; the same man stole all my customers from me on that talc dodge. Let this club find him and have an example made of any man who would sell talc for facing." There is no knowing where he would have stopped had he not been interrupted by the president, who insisted on order being preserved. It might have been the heat or it might have been the Detroit river water Mr. Hill had been drinking, but it took the united energies of Messrs. Smith, Vrooman and Griffith to get Mr. Hill seated and quieted. Mr. Millns said this was a serious matter and he was glad it had been brought up. He had heard that talc was used by some unscrupulous people to mix with plumbago, and he was greatly shocked to know that the attempt had been made to sell it outright as a facing. He thought it better to be strictly virtuous in all business matters, and moved that a committee of one be appointed to investigate this complaint and endeavor to locate the guilty party. Mr. Vrooman seconded the motion and said he thought it would be a good plan for the Foundrymen's Associations to give this subject some attention by having a member of

the club read a paper on "Pure Goods and Where to Get Them."

The motion was carried and the chair said he would appoint a certain gentleman to investigate fully and report at the next meeting. Amid breathless silence he named J. D. Smith as the club's investigator. No comments were made, although Mr. Griffith same nearly smiling—out loud.

Mr. Bullock announced that the committee on permanent headquarters had selected a nice site in Cincinnati, as per instructions, and had had them neatly furnished, but as he knew most of the members went to the sea-side during the warm weather, he moved that the president call one meeting in some Eastern city during the heated spell, after which they could open the rooms in Cincinnati with a reception to their friends.

Mr. Baird, of the Jos. Dixon Crucible Co., seconded this and suggested Jersey City, but it was left to the president.

The secretary said that Mr. S. T. Johnston, of the Whiting Foundry Equipment, had applied for membership, paid the necessary fee and was waiting to be elected.

Mr. Vrooman said he had no objection to Mr. Johnston personally; he was an agreeable young man, told good stories, smoked good cigars, and was a good judge of—well anything connected with the foundry business—but he had one fault, and he thought it only fair that this club should know it, and that was that he seemed unable to talk on any subject for five straight minutes without wandering off to the Whiting Cupola. He did not know how he acted at home, but he had never yet seen the gentleman when he was not talking about the Whiting Cupola, Whiting crane, Whiting ladles, and he hoped if admitted he would not attempt to talk shop at any of their sessions.

The president promised to look after that, and after Mr. Johnston had been elected to membership Secretary Frohman introduced both the gentleman and his smile to the club. President Hibbs said it was customary to allow newly elected members the privilege of entertaining the club, and he felt it would be an injustice to Mr. Johnston to depart from the rule in this case.

The newly elected member expressed his willingness to do what was right, and after waking Mr. Hill the meeting adjourned subject to the call of the president for the purpose of investigating Mr. Johnston's expense account.

A foundry acrobat—the tumbling barrel.

The musical instrument of the boiler room—the mud-drum.

Corners the air—the air compressor.

A melancholy object—the sad iron.

Windy but useful—the blowing engine.

Knows all the gates—the molder.

Runs straight away—line shafting.

Fast time for tired wheels—that shown by bicycle racing records.

Not required in the railroad restaurant—fish plates.

High explosives—those used at and around Leadville.—Age of Steel.

Atlanta, Ga., July 2, 1895.

The Foundry Publishing Co., Detroit, Mich.:

Gentlemen—We have just received a sample copy of THE FOUNDRY. We are well pleased with same, and enclose you herein our check for $1.00 for one year's subscription to same. Thanking you for calling our attention to this journal, we are,

Yours truly,

GEORGIA STOVE WORKS.

Per Alex. S. Seals, Gen. Mngr.

Mr. C. A. Bauer, manager of the extensive works of Warder, Bushnell & Glaesner at Springfield, Ohio, has something else to feel exceptionally proud of now besides the reputation of the Champion agricultural implements and the mammoth foundry connected with that establishment. His son, Charles L. Bauer is only 24 years of age, but he has found time to become a musician of national prominence besides occupying a very responsible position in charge of the chemical and physical laboratory and attending to other things at that well-known establishment. During the last week of June a grand reunion of the Ohio societies of Christian Endeavor was held at Springfield, Ohio, and elaborate musical arrangements were made in connection therewith. Mr. Charles L. Bauer was placed in charge of both the orchestra and chorus of 300 voices that led the musical services, and the Springfield papers of that week gave much of their space to paying him some distinguished compliments.

Melting Point of Cast Iron and Steel

Locomotive Engineering says that in its columns two questions had been answered which related to the melting point of gray cast iron, and it was discovered that there was over 1000 degrees difference in the melting points given. One question had been answered by one editor of the paper, the other by the other, and each consulted his favorite engineer's book, with the result stated. Then it was determined to compare a few books used for reference. Here is what was found:

	Melting point of cast iron. Fahr.	Melting point of steel. Fahr.
Haswell	2,000 to 2,250	2,500
Trautwine	1,720 to 2,800	2,370 to 2,500
Clark	2,786	2,372 to 2,552
Ramapo Co.'s Handbook	2,786	1,873
Scranton Colliery Engineerings Co.'s Handbook	2,192	2,520
Jones & Laughlin's Handbook	2,210	2,462
Greenwood	2,912 to 3,452	3,272
Bolland's Iron Foundry	3,477	3,501
Rolland's Iron		

The American mining convention has been called to assemble in Atlanta during the Exposition, on the first week in October. The call was signed by Mr. John Wilkes, of the Mecklenburg Iron Works, of North Carolina; Mr. T. H. Martin, manager of "Dixie," and other gentlemen interested in the development of the mining industries of the south. It is proposed to give a practical turn to this meeting, to the end that the unparalleled resources of this region, which will be displayed at this Exposition, as never before exhibited anywhere, may reap the full benefit of this display by the attraction of profitable investments of capital.

Knew His Own Value.

Every jobber in Yankee notions knows the D—— Brothers of ——, Iowa. Their rating in Bradstreet's is X—17, and there is scarcely a firm in Chicago but what would sell them all they want—for cash. Familiar with their weakness, merchants govern themselves accordingly. So when Ikey, the senior of the firm, recently announced himself ready to buy his spring bill, Mr. K., of R. K. & B., waited on him personally, and sold him a bill amounting to $1,850.

"Now, Mishter K.," said Ikey, "I tell you vot I do. I gif you fifteen hundred tollars gash, unt de balance I gif you my nodt. Ish dot all righdt?"

"Perfectly satisfactory to us," said Mr. K. The note was made out and signed, the $1,500 currency paid over, and a receipted bill given.

"One ting more Mishter K.," said Ikey before bidding him good-by. "Now I haf bought a big bill mit you, and I tink you couldt gif me a nice bresent for me und for my brudder."

"Well," said Mr. K., "I hardly see how we can afford to do that. You see, we sold you the goods very close and in addition are giving you four months' time on your note for $350. However, not wishing to refuse you altogether, here is a nice pair of suspenders for you."

"Na! na! Mishter K., dots not righdt. I buy ofer eighdteen hundert tollars mit you, undt you gif me ein bair of suspenders. Dot's not enough. You musht do petter ash dat!"

"Well, I'll tell you what I will do," finally said Mr. K. "If the suspenders are not satisfactory to you, here is your note for $350—we will make you a present of that. Is that sufficient?"

"Vell, I guess I take the susbenders!" said Ikey.—Sunday's Times.

The June number of the American Amateur Photographer is fully up to the high standard of that excellent journal. The illustrations are all fine and artistic. "Homeward," by Karl Greiger, is a beautiful pastorial scene and is a worthy companion piece to his "Changing Pastures," while both are hard subjects very admirably treated. For the amateur, pure and simple, there is probably no photographic journal more suited to their wants than the Amateur Photographer; the "Beginners' Column" alone, is well worth the cost of the magazine. The American Amateur Photographer. The Outing Company (Limited), publishers, New York.

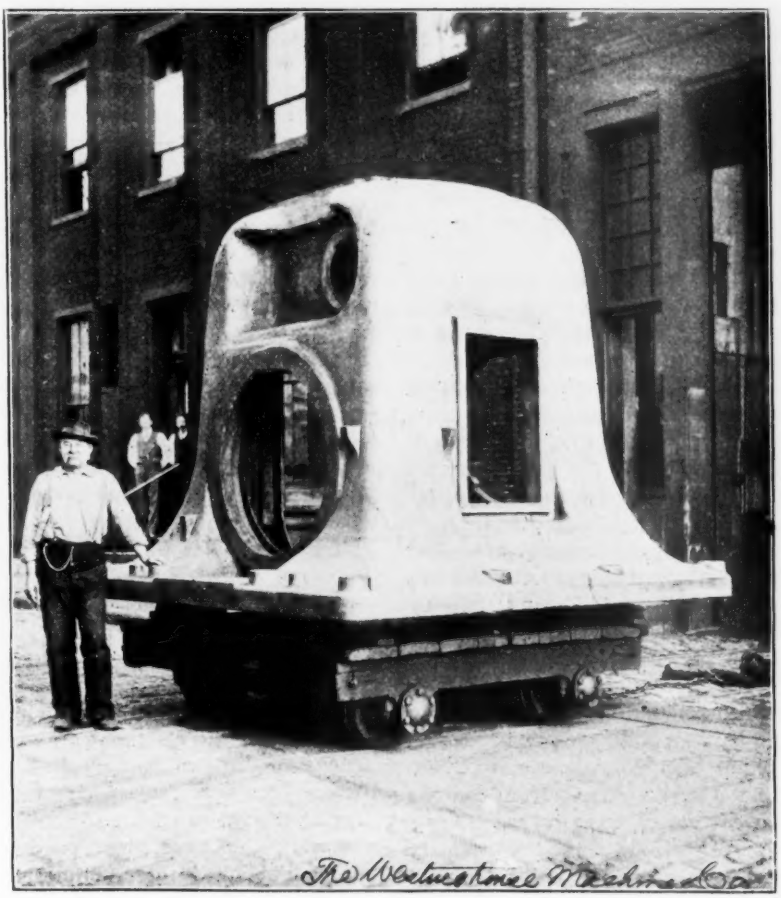
THE FOUNDRY

VOL. 6. DETROIT, MICH., AUGUST, 1895. No. 36

Heavy Castings in Green Sand.

THE FOUNDRY does not believe that it can consistently congratulate those in any way interested in the foundry business, upon any rapid improvement in the quality of the castings that are turned out in these days by American foundries. In 99 cases out of 100 it is simply a case of quantity, and anything that will pass inspection will do.

This is true to an astonishing extent even in those establishments where the castings have to be finished and used in the manufacture of machinery, etc., and where there is an apparent disregard of the fact that a dollar or two spent in the foundry would often save five, ten—yes, and sometimes a hundred dollars—in the machine shop and elsewhere. How often have we all seen instances where, if a little better sand had been used, a drop might have been saved



Engine Bed Casting for 1000 H. P. Triple Expansion Engine.

that destroyed the casting, and yet the difference between a first-class and poor sand is generally much less than 50 cents a ton, and less than five cents on a casting where loss was the loss of dollars. Has not the saving of a quarter's worth of facing often given laborers and chippers hours of extra labor?

Does it not seem supremely ridiculous that any man or concern should be so penny wise and pound foolish as to buy a close grained No. 3 iron just because it costs even a dollar a ton less than a first-class article, and then put it into castings that have to be finished all over or in part, or are required for some severe duty where strength was necessary?

Examples of this latter are every day occurrences and fully as common as cases where, for the sake of saving 25 cents a day, a good man's services are dispensed with and an inferior man given work to do that finds its way to the scrap heap, instead of the cleaning room.

That is one side of the question, unfortunately all too common, but not universal, and the fact that some prominent exceptions exist make both sides more conspicuous. This has all been suggested by one of the exceptions.

The Westinghouse Machine Co., of Pittsburg, and their foundry foreman, Mr. H. H. Garrett, are to be congratulated because of the fact that they successfully make in green sand a line of complicated castings that are not excelled, if equaled, in America. Take, for instance, the casting shown in our illustration and intended for one of the bed castings for a Westinghouse engine, and beside which Mr. Garrett is seen standing. It is nine feet square at the base, seven feet six inches high, and weighing 24,450 pounds, or about twelve and one-half tons, the only dry sand about it being the few bolt holes in the bottom.

As far as the cut, made from a photograph, is concerned, a poorly molded casting would look as well, but a close inspection of the original tells the whole story. Notwithstanding the immense strain on the bottom of a casting of this size, weight and shape, they are made almost absolutely without strain or scabs, the chief difficulty in green-sand molding for castings of this size. Neither are there fins or traces of flask joints, and it would be considered a remarkably good casting from a loam or dry sand standpoint.

The method of molding is simple. The pattern is made the shape desired for casting, bedded in drag, and interior core rammed up, vented and secured and not handled, but remaining in its place, afterwards outside cheek is rammed up and cope as well; the latter lifted off, then the cheek, which is split in two pieces, folds back, taking one-half of pattern in each side. Any additional cores needed are built on main inside core, and the mold finished and put together again. Of course nothing but the very best sand could be used for such work, and it may not be amiss to note that E. M. Ayers, of Zanesville, Ohio, the extensive sand dealer, takes considerable pride in stating that he furnishes this large concern with what they need in that line, and as the Westinghouse Machine Co. use green sand exclusively in nearly all their work, even to their compound cylinders, it is quite a compliment.

Pressure on Molds.

Part II.

H. M. RAMP.

In the July issue of THE FOUNDRY an article appeared under the above heading, but it was simply an endeavor to show what this pressure was, and how often it was far in excess of what we imagined, and how uncertain guess-work is. While in this the object will be to show a few of the methods used to resist such pressures, and a few of the faults that are prominent in this direction.

It is far easier to ascertain what strain is on our work than to calculate the exact strength of the rigging and fixtures used to resist it. This is true for various reasons. Molders and helpers in a foundry do not subject their tools to very gentle treatment. The sledge hammer and rapping maul is used too often in a rough, careless way, that brings disaster to many a flask before its time. This is a fault peculiar to molders, that it is hard to cure, and the best remedy the writer has ever found is to make them strong enough to stand almost any treatment. Too much strength, too much weight, rigging made heavier than necessary is ex-

cusable, but fixtures of the light, flimsy character are monuments of disgrace to any intelligent molder. In the past I have often referred to such appliances, and sometimes fear it will appear a threadbare or oft repeated tale, but so much depends upon such things in the faithful performances of our work that the desire to impress forcibly and often these questions and faults is an item of interest to me always.

The first table given in last month's issue shows pressure on square areas, and is sometimes surprising. Assume that a cope has to be made eighteen or twenty inches deep through some flanges or ribs in the cope, and see what a difference is made in the pressure. The result is to instantly double it; yet do we often double the strength of our rigging or double the weight used, do we study the effect on the bars and cope when an unusual strain is applied?

Pine bars made from seven-eight or one-inch lumber are often used in flasks six feet square, and sometimes they will not be over five or six inches wide or cut out in spots to suit some flange or lug until little is left to stand the strain. Often large flasks will lay in the flask yard, next the ground, and the bars become partly rotted out, and when brought in the shop used without any examination. If the casting is all right it passes criticism, and is taken out to rot a little more and catch the next molder in trouble that uses it; or if the mold falls out or spoils the casting in any manner an examination is then made, and the weakness repaired after the misfortune—the proverbial horse and stable-door story.

Such little items come up daily and are overlooked through neglect and forgetfulness, or a sublime belief and confidence in the "Goddess Luck," or previous workmen.

The bars in a large flask should be examined every time before using, and also the corners, and upon the first appearance of any weakness have it repaired. Many times has the writer witnessed and experienced just such performances; a loose or broken bar would permit the cope to strain and render the casting worthless, or when the bars were all too weak and light the casting would be found too thick in the center, simply caused by the enormous strain and weak flasks. It is impossible to make a large plate straight when the cope gives and allows parts and nearly always the center of the plate to be thicker than the rest. The laws of contraction render it impossible to remedy the same in any way except through the flasks. As previously stated a large cope should always have a few iron bars, and it often pays to make iron bars for special jobs. They can be made so that it will be possible to put them in or change them at pleasure, and the security they give to a cope is remarkable. But even where this is not done it is always possible to use a rail or girder across and wedge the bars down from it.

Another trouble we experience is a niggardly or miserly disposition in the use of clamps; they will be placed too far apart, and too much strain permitted between them (a little study in leverage would often assist molders), or placed upon the handles nailed on the sides, which are always uncertain for such purposes; also, light wrought iron clamps are often sought after and used on account of weight, while in truth they are miserable tools to place any dependence in, and will spring or give on the slightest provocation. It is always best to make them of cast-iron, even if they are large and heavy to handle.

Not long ago the writer noticed a molder clamping up a flask three feet square and putting part of them on the ends of the flask. In response to the inquiry why he placed them there, he said: "To hold the pressure." The answer and intention was correct, but his practice was unreasonable. All the bars in the flask were nailed to the sides, and the ends joined to them, so where could there be any benefit in clamping the ends? All the strain came directly on the bars from there to the sides, and lastly to the ends; the result was to simply give the strain or pressure a leverage against its environments. If the bars in the flask could be securely clamped down the sides or ends would need no securing. This is the reason iron bars are so essential, and the clamps should be placed as near as possible at their ends.

Clamps are strange tools, anyway, and it is remarkable how, when looking for a certain size, those it is possible to procure are either too long or short, and the discovery is often followed with some choice specimens of profanity. You can often witness

the manner that clamps are adjusted when too long for the flasks in any of our foundries; placed at an angle of thirty or forty degrees, and simply resting on the sharp corner of the clamp, this gives it an admiral opportunity to sink into the wood a sixteenth of an inch and permit a run-out; also hastily pulled on flasks where the flask is sprung and the bottom board does not come up against the drag. The pressure pulls the board up to the flask, and allows the same old story—a run-out. There are a few little, well-known precautions that will obviate all these difficulties that will bear mention. Always block clamps up, as near square with the flask as possible, and lightly drive a wedge in the space between clamp and block after it is drawn tight, and when joints or bottom board and drag do not fit closely together, wedge between them at every clamp before drawing the same tight. This, of course, is only necessary where some pressure is applied and the casting is of a fair size. However, in places where great pressure is exerted, it is often advisable to use iron plates for blocks and iron wedges, for the clamps will invariably sink in the wood under great strain.

There is a large percentage of our bad work made through these causes, and some molders appear to excel in this direction. A little incident occurred in an Ohio foundry that often caused a smile when spoken of. Two young molders were working together on a job, and almost every day would have a run-out. So one afternoon old Jones came up to a little group of the boys and remarked, "Jimmy and Harry are writing a book on molding, entitled 'Forest and Stream.'" Upon inquiry as to the application of the title the following response was elicited, "Oh! 'twill take a forest of lumber to make them flasks and streams of water to keep from burning them up." Pardon the digression, but the story is too often applicable, and solely through ignorance of the pressure contended with.

Very large castings are usually made in the floor, and the cope weighted down, which practice entails a great deal of work and often danger. A great many failures in casting large pieces has resulted from such causes, an instance of which I will relate. A molder in an eastern foundry was making a large kettle, bottom down in the floor, which weighed in the neighborhood of three tons. The weight of the core and cope was great and the parting upon which it rested narrow, and for fear of crushing the mold he did not use enough weight. The result was, the inside raised and spoiled the casting. The next time he combined a little calculation with his judgment and figured out what it required to hold the casting, and instead of putting his weights on the cope, laid blocks on the floor, two feet outside the flask; laid rails over the top, resting on the blocks. The weights were then placed in position, and the cope wedged down securely from the rails.

This practice was not by any means new, but it shows neglect of precautions that are so often necessary. This plan relieved all weight from the mold, but made the mold perfectly secure at the same time.

The following plan obviates all difficulty in weighting molds, and is one worthy of serious consideration by any shop that makes a great deal of work in the floor. Dig a pit several feet wider and longer than you usually use and about eighteen inches deeper; then make a number of cast-iron girders to lay across in the bottom, and have eye bolts fastened in each end of them, that come level with the floor. Lay a number of cast-iron plates across in the bottom on the girders until you have a cast-iron floor. A cinder or coke bed about one foot deep should then be put in on top of the plates, and the pit filled with sand, and it is ready for use. Careful provision should be made for the vent pipes, they being large and supplied with cast stoppers to prevent any sand from getting in them. It is remarkable how long a cinder bed of this description will last. The writer has been using a large pit made in this manner for over two years, and it has never been dug out. Then make some bolts with hooks on one end to fit the eyes in the floor, and use girders across the top of the flask, and bolt the same down. If the pit is not over eight or nine feet wide railroad iron makes good girders, and two men can easily handle them, but if wider it will become necessary to use cast-iron girders, as the rails would spring. This makes a rigging which is unequaled for security. The only way the cope can raise is to break the bolts, which can always be made sufficiently strong to resist

any possible pressure; besides, there is no danger of crushing the mold, no matter how narrow the bearing at the joint, for the bolts have only to be drawn tight. The labor saved in handling weights quickly pays for the cost of the pit, for no matter if the pressure exerted is five of fifty tons, a few rails or girders placed in position and screwing up the bolts constitutes the work.

Those who have used tons of weights on castings and had to place them in a hurry and hoist them all off before shaking out, will appreciate this rigging. The same plan can be used in making pits for columns or long sills, and be just as economical. Some shops have even gone farther, and in some instances built pits with a large plate in the bottom filled with T cores to suit flasks of different widths or diameters, and at the same time bring the bolts close to the edge of the flask in any case; but this plan is a little expensive for all the difference in its convenience.

The Need of Better Systems.

A. SORGE, JR.

We are at present passing through a period of transition in foundry practice; leaving the old-time empirical rules of thumb and entering upon methods more in accord with modern exact science. The demands made upon the modern foundryman are growing more severe daily. Hard times, together with fierce competition and greatly reduced prices, and simultaneously more perfect work is demanded. These conditions naturally induce a more minute examination of the various processes in use in foundries, and lead to the not very flattering discovery that in the great majority of shops there is a most lamentable want of exact knowledge of these processes. The individual craftsman is relied upon in most cases to do the required work, and uses such means as his intelligence and previous experience seem to point out. Memory is the guide to reproducing results that were satisfactory, and to avoiding others that were disastrous. Human memory is at best a frail support to lean upon, and when the conditions are so numerous and the materials employed vary as much as in foundry work, then, indeed, it is a marvel that we have heretofore been able to accomplish the work which surrounds us. In almost all other trades the experience of a large number of men has been gathered and compared, and exact rules and data for the guidance of those interested are available in numerous directions. No such assistance is given the foundryman. It may be accepted as an almost general rule that each foundryman is a law unto himself in his work, and criticism of his methods is usually resented with much energy. Still the fact remains that only too often is failure ascribed to that scapegrace, "bad luck," simply because of either too great indolence or ignorance of the methods of investigation which would lead to the discovery of the true cause.

When we survey the various mechanical trades and observe the features which have become most prominent during the most recent period of great advancement, we are struck by the fact that very few men with scientific technical training are to be found directly engaged in foundry work, while the other trades seem to absorb such men in an ever increasing number. These men have been trained to methods of exact observation, and they carry these methods into the work which they undertake. Exact observations of all the conditions involved in a piece of work, whether the same be a success or a failure, when frequently repeated show the conditions which produce good work and those which spoil it.

It must be borne in mind continually that no effect is produced without a cause, and the same effect will always be reproduced by the same cause if all the conditions are alike. We are frequently told, when one or more of a series of identical pieces has turned out bad, that the work had been done exactly the same on all, and that all the conditions were alike, thereby leading to the conclusion that some deep mystery surrounds the foundryman's work, and that success or failure cannot be predicted absolutely in any given case. If this were true then, indeed, might we remain content with present achievements. But the admission of such a state of affairs is too absurd for consideration. What is needed is closer and more exact observation of all conditions involved, together with careful records of same, which shall also state results. Such records should be kept in a uniform manner so that observations made by different

individuals shall be directly comparable.

It is the province of our professional and trade societies, and of our technical schools, to take up this matter of records and to formulate methods of observation, as well as to point out the missing data in the observation of conditions already made. Some work of great importance is now being done by individual observers in various directions, but their efforts lack harmony of methods, so that the observations cannot be compared easily. Again, investigations of great value have been undertaken by some of our great technical socities, aided by some of the technical schools. But we find that these investigations are directed almost entirely at determining the value of the material produced, as distinguished from that of the materials and processes employed in making molds, scant attention being given to the latter. No matter how thoroughly we may care to know the exact composition (both chemically and mechanically) of castings which we desire to produce, together with the best and cheapest methods of obtaining this composition, we will still be groping in the dark, until we reduce the process of molding to an exact science. We need the assistance of men who have the time and training for exact observations, and such men we can find in our technical schools.

Foundry practice is bound to become as exact and scientific in character as watchmaking; but only the accumulation and comparison of a large number of exact observations of all conditions will give up the necessary data for doing our work in such a manner that we can accurately predict results.

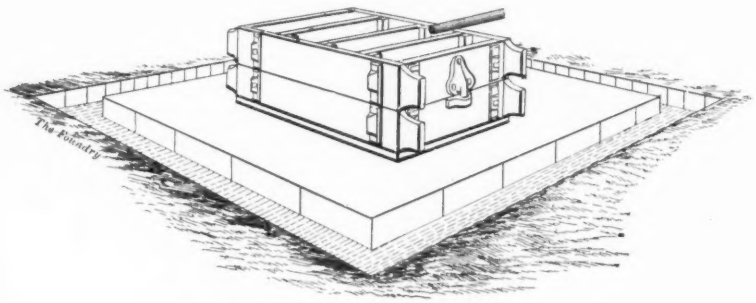
Our Foundrymen's Associations (both Eastern and Western) should be the pioneers in a movement towards this end. If they will take up the matter, formulate methods and records, and begin the collection of data, they will inaugurate a new era in foundry practice.

Making Castings on a Float.

Recently much attention has been given to the great variation in strength possessed by castings of equal size and poured as nearly as possible with the same metal.

John Gaunt, of Gloucester, N. J., claims to have carried this subject further and to have discovered that in the vibratory jaring motion of the earth may be found to some extent a solution of the problem.

Mr. Gaunt, in a paper recently written on this subject and entitled "A New Mode of Casting Bells," says: "It has long been known that some castings are much more easily broken than others, though cast with the same care, of the same metal and from the same patterns.



Apparatus for Casting on Float.

"This difference has not been heretofore accounted for. According to the theory received by the scientific men of to-day, namely, that the molecules or atoms of matter do not touch each other; that the strength of a mass of metal depends upon their proximity, and a regular distribution of their relative places throughout the mass; also that the pushing or scattering apart of the atoms by application of heat, which weakens their attraction, while their gravity is not effected is the case of a metal becoming a liquid. When metal is poured and the atoms are reassuming their regular relative places, in the process of cooling, the almost constant, yet imperceptible tremulous motion of the ground caused by carts, wagons, railroad trains and heavy machinery, would disar-

range the regularity of the atoms, which are so inconceivably small that a motion the five-billionth part of an inch in length would destroy their arrangement should it occur at the proper moment."

He then cites as practical proof of his theory some of the bells cast for Philadelphia. Following the "Old Liberty Bell," one of 4,000 pounds was put up in the State house steeple in Philadelphia in 1828 by Willbank. It was molded by Louis Debozier, well-known to the "old volunteers' fire association" as a good bell maker. This bell could be heard distinctly at Gloucester, Woodbury, Haddenfield and often at Burlington, eighteen miles distance, where the people of these places used to set their clocks by it. It was taken down at the centennial anniversary and replaced by a bell presented by Mr. Seabert, nearly four times as heavy. This bell was never heard in the above named places, was at once condemned and replaced by the one now in the steeple, which has about one-fourth the power of the Willbank bell, with nearly four tims its weight. What but the disturbance of the natural arrangement of atoms at the moment of cooling could cause this? Mr. Debozier said just before his death, that he could not tell why bells so differed when of the same metal, same mold and same weight. I gave him my views, which he said agred with his experience, for the best bell he cast in all his life he cast in the silent hours of a Sunday night when all was still, and he thought that must have been the reason it turned out so well.

The accompanying cut shows the principle of the system for which Mr. Gaunt has applied for a patent.

Into the ground is built a tank, which is made perfectly tight, for holding the water upon which is placed the float.

It will be noticed that upon this is placed a flask containing molds ready for pouring. The float and flask are kept entirely free from all jar by the water, and it is claimed that anything poured in that way will possess greater degrees of strength and in the case of a bell gives a better and purer sound than otherwise.

A New Facing.

The Dixon Crucible Company, of Jersey City, N. J., advertise a new facing in this issue. It is made of Ticonderoga graphite and tests that have been made would seem to indicate that it will supercede East India and silver leads. Ticonderoga graphite it is said is not so easily burned as the Ceylon graphite (commonly known as plumbago), and does not wash before the metal. As the company offer to send samples any founder can test for himself. Ask for sample 2441 Ticonderoga facing.

The Western Foundrymen's Association.

The regular meeting of the Western Foundrymen's Association was held Wednesday, July 17, at 7:30 p. m., at the Great Northern Hotel, Chicago, the vice-president, Mr. A. W. McArthur, being in the chair.

Mr. James Frake reported for the committee on by-laws that they had partially completed their work, but that they desired some assistance from the association. They wanted any members who had any suggestions to make regarding any changes or amendments to the by-laws, to send them in to the secretary so that they could be incorporated in the new by-laws when they were completed.

The following firms applied for membership, and on motion were unanimously accepted: James Leffel & Co., Springfield, O., and York Foundry & Machine Co., York, Neb.

A paper was read by Mr. H. S. Vrooman, of Chicago. The speaker prefaced the reading with the statement that several of the ideas contained in the paper were suggested to him by foundrymen in Chicago, and while he did not wholly approve of them himself, he desired to have them discussed by the association, and consequently presented them as they were given.

The Future of the Association.

The first step to be taken to make the future of the association, is to secure rooms and establish a permanent headquarters, where the members can go of an afternoon or evening and the foundrymen visiting the city can get such information as they may want.

Rooms can be had in some of the large office buildings at a reasonable rate. The

Association can secure the service of a stenographer, who can act as attendant and at the same time do the stenographic work of the Association. This would relieve the secretary of considerable work, as the attendant could send out bills and notices, and do other minor work, which is now being done by the secretary. The expense the Association is now under for stenographic service could be applied to the attendant's salary, the additional cost would be small. All the mechanical papers and journals could be kept on file, which the publishers no doubt would be glad to send the Association free.

Nice, pleasant rooms kept in order, would add much to the Association, and would open a place where the foundrymen would be pleased to go, and would gain for the Association many members. The next step should be to classify the membership and divide into honorary, associate and active take in such proprietors and managers who do not care to attend the meetings but join to help the Association along; the fee for which should be a stated amount and entitle them to a life membership. The associate members to be newspaper men, supply men and chemists, while the active members to be those actively engaged in the business, also managers, superintendents and foremen. Members of all classes to have privilege to take part in the discussion of papers and the social features, but the honorary and associate members would have no voice in its management.

There are a number of foundrymen who believe the question of wages and the price of castings should be taken up by the Association, and an agreement made that will prevent the cutting of prices. These subjects have never come before the Association, and it is well that they have not, as the introduction of some would result only in the Association's downfall. Were the Association inclined to take them up, the vast difference in the work, the location, the facilities and the individual would prevent. No, this Association cannot interfere with the individual right to compete. The march has been onward, success has crowned the two years of its existence, and it cannot now take a backward step. The object is education, not combination.

Another question which is spoken of by the foundrymen is that of credits. The argument used, that business men in all branches are organized to protect themselves from bad debts. Why not the foundrymen? This question, like that of prices, cannot be taken up by the Association. Were it advisable to consider it, the expense and work necessary to carry on a thorough system of credits would be against it. The Association is on the right track, let it make no switch, and it will prove that scientific research is more valuable and will bring better returns than the questions of prices and credits.

The meetings of the Association have been confined to Chicago alone, but this is not a good plan. Arrangements should be made for holding meetings in other cities. Places can be selected that have points of interest, as Milwaukee, Racine and Joliet. These three cities have in all about fifty foundries. At Milwaukee, the E. P. Allis Co.'s plant could be visited. Racine, the J. I. Case T. M. Co., and at Joliet, the Illinois Steel Co. The Association has members in each of the places mentioned, who could insure a good attendance. This plan, if adopted, would add many members not only in the cities where the meetings are held, but from all the surrounding places.

Chicago and vicinity, with between 90 and 100 foundries, presents a splendid field for work. For some reason the foundrymen have kept away from the meetings, and taken no part in the Association. Some plan should be adopted or influence brought to bear that will cause them to become members. It would be well to send a circular letter to each, stating the objects of the Association and soliciting their support.

There should be more social features connected with the Association. Something that would relieve the mind and take it away for the time being, from the cares and questions of the foundry. Smoking parties with a little music, meetings where the acquaintance of each other can be made, talks on the questions of the day, and papers on economic questions by well-known writers. These and many other social features could be added to the present work and would bring many to the meetings who could not be reached in any other way. Separate meetings could be held for the social work of the Association. On the sub-

ject of foundry practice, a course of lectures on chemistry, giving the names of chemicals and how determinations are made in the analysis of iron, would be of interest and materially aid in the study of iron; papers on the handling of men; the best men to hire; the apprentice system, etc., would interest most foundrymen.

The past work of the Association is commendable, and has placed its members in a position to question statements made by writers on foundry practice. which heretofore has been accepted. With the proper management, the Association must become a power, and with the progress in the next two years, that has been made in the past, it will stand in the first rank among kindred associations.

After the discussion of the paper, a motion was carried that the president appoint a committee of three to look into the matter of securing headquarters for the association, the committee to report at the next meeting. As this committee the chair appointd Messrs. A. Sorge, Jr., S. T. Johnston and O. T. Stantial.

There was a long discussion of the various other points touched on in the paper, which was taken part in by Messrs. A. Sorge, Jr., W. N. Moore, James Fyfe, James Frake, A. W. McArthur, H. S. Vrooman, John Ramsey, William Ferguson, W. A. Jones, O. T. Stantial, S. T. Johnson, John Wilkin, Major McDowell, B. M. Gardner and M. N. MacLaren.

The discussion, which was very informal, took a wide range. Messrs. Jones, Ferguson and Ramsey, speaking from the standpoint of non-members favored the suggestion made for a division of the membership in classes, the active members to be foundrymen, and the associate members, those indirectly interested in the foundry business. Mr. Ramsey, who like Mr. Jones, is a veteran Chicago foundryman, suggested that organized action among foundry proprietors to free their shops from the baneful influence of the drink habit among molders, might be taken by such an association. He believed that drunkenness was a greater detriment to foundry operations than it was 20 years ago. Foundrymen, by taking cognizance of the evil, might devise means of coming into closer contact with foundry labor and try to develop and help their employes. The closer together employers and employes can come the better the results. How to manage men, how to get a sober shop—these are questions of utmost interest to every proprietor. From his experience of 25 years in Chicago, Mr. Ramsay affirmed that there were not as great a proportion of skilled molders to-day as there were 20 years ago, though there are greater requirements of the men to-day, greater demands made upon the foundrymen to-day than 20 years ago. The trouble is that foundrymen are not pursuing the right method. Each foundryman is running his foundry separately and independently and it injures the trade. Discussions on these questions of management are what he would like to hear at association meetings.

Mr. Jones called attention to a question worthy of discussion—the apprenticeship system, or, rather, the lack of it, in foundry operations. It is suicidal, almost, to attempt to take apprentices into the foundry. America produces first-class workmen —no doubt about it; but it produces specialists. The speaker once thought he learned his trade in one of the worst shops in the universe, because one day he would work on a stove plate, anothr day on brass, another day on malleable and so on. But as he looked back upon the experience gained in that jobbing foundry, he concluded it was a good place, after all, in which to learn a trade. He knew of a concern that tried to work in a line of apprentices. They grew so tired of the arrangement that they were glad to offer the boys so much money to be relased from the contract to keep them and teach them the trade. The specializing of to-day has made it possible for men engaged on a single line of work to make a large output—one that would make a first-class molder ashamed of himself. Yet men who could make a big record on pulleys, for example, couldn't make a sash-weight.

Mr. Ferguson agreed that the question of apprenticeships was one which should have the attention of the association. He had been trying to work it out to a satisfactory basis, and had four or five apprentices at work of whom he was not ashamed.

Maj. McDowell, being called on, referred to the work done by the Foundrymen's Association, in its Philadelphia meetings. Papers on various subjects were secured by the secretary and entertainment provided. The members listened to the papers and

were benefited by them and had a good time socially, but they rarely took part in discussions. An association to be of most value to the practical foundryman must be one in which every man comes in and has his say. Each has some experience in the foundry which is of value to his neighbor. And if the secretary would send out questions on a selected subject and secure an interchange of exprience, meetings could be made intensely interesting. Maj. McDowell thought thre was not so much diversity of interest, after all, between th pig iron man, for example, and the foundryman. The pig iron man certainly wants to furnish the kind of iron the foundryman wants; but the pig iron man says that to a large extent he is expected to go and tell the foundryman what he wants. It is intresting to see the various ideas men have about a foundry, and it is the rule that every foundryman has the best foundry and knows how to do exactly what he wants to do, but never succeeds in coming fully up to his expectations. He thought the association might in time be able to establish standards for buyer and seller and decide questions that come up between thm. What is a standard run of iron? It is anything that the iron man has got to sell, that he thinks he can get you to buy. The salesman does the best he knows how and the less he knows about iron, often the better salesman he is. There should be some means of adjudicating the questions that come up between seller and buyer as to the analysis of iron. What does No. 1 mean? What is No. 2? So much in silicon. That is the measure of what your iron is, after all, so far as the foundry is concerned. No. 1 iron carries so much scrap; No. 2 doesn't carry so much; No. 3 will go less. But these differences result from the variation in composition, shown by chemical analysis. If your iron were bought and sold by analysis, a standard would be established and these questions settled by common authority. Let the foundryman and the man who sells to him come into your association; let both share the expense of determining these questions.

Mr. McLaren, chemist for the E. P. Allis Co., explained the work done in the laboratory of that company and the value it had been in the operation of the foundry. Maj. McDowell described the method employed in a large eastern foundry. All iron and scrap was sorted and inventoried according to chemical analysis. Throughout nine months' operation, of which the speaker had seen a record, there was scarcely a variation to which exception could be taken, because the iron was tested every day—every heat tested.

Mr. O. T. Stantial made a statement correcting the stenographer's report of the last meeting of the association. Mr. Stantial was quoted as making reference to "praphitic gases." The expression used was "occluded gases."

On motion, the meeting adjourned.

The Aluminum Market.

No. 1 aluminum (guaranteed to be over 98 per cent pure), in ingots for re-melting:

55 cents per pound in small lots.

52 cents per pound in 100-pound lots.

50 cents per pound in ton lots and over.

No. 2 grade (guaranteed to be over 94 per cent pure aluminum, with no injurious impurities, for alloying with iron and steel), cast in ingots for re-melting:

53 cents per pound in small lots.

50 cents per pound in 100-pound lots.

48 cents per pound in ton lots and over.

Aluminum guaranteed to be over 99 per cent pure, or over 99.60 per cent pure, is quoted at special rates.

Aluminum castings are quoted at 90 cents per pound upward, in accordance with the number of castings, their weight, cost of molding, etc. The prices of castings of aluminum hardened with other alloying metals, the same as for pure aluminum castings. Hard aluminum castings can be furnished with a tensile strength of at least 30,000 pounds per square inch. The shrinkage of aluminum is a little more than that of brass, being 17-64 of an inch to the foot.

To obtain the weight of aluminum in castings, bars, sheets, etc., divide the weight of similar pieces of copper by 3.3, brass by 3.1 and steel by 2.9.

The demand for aluminum is growing rapidly. The general improvement in business has had a marked effect in stimulating many new uses for the metal.

The E. P. Allis Co., of Milwaukee, Wis., have given a 10 per cent raise to all employees.

A TECHNICAL JOURNAL DEVOTED TO FOUNDRY INTERESTS.

THE FOUNDRY

Published Monthly by

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JOHN A. PENTON,

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THE FOUNDRY is issued promptly on the tenth of each month, and will spare no endeavor to furnish valuable news and information to those interested professionally or incidentally in molding, melting, mixing of metals, foundry management, etc. Persons connected with any of these lines of industry will confer a favor upon the Editor of this Journal by sending him news from their section of the country pertaining to the foundry interests, particularly individual theories and experiences of practical value.

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The Trade Outlook.

Business seems to be getting gradually better. There is not only an improvement in the quantity offered, but there is likewise an upward tendency in prices in a few lines that may possibly extend to others. By almost common consent wages have been increased generally and strange to say, in the majority of cases, before the employes had time to make any request and those who have not done so have to figure on the possibility of doing so in the future, when estimates are being submitted.

It is the same with iron, although it is not expected to do any steeple climbing as far as price is concerned, but it is safe to depend upon its holding its own and not getting lower in price for months to come.

There is more of an improvement apparent in the jobbing foundry line than there has been for some time and the heart of the manufacturer of stoves is being gladdened by the prospect of a good fall business, in fact, much better than they have had for years. In fact, in all lines, there is a more buoyant feeling than has been known for a long time. One remarkable feature of the business improvement is the apparent absence of any heated political discussion in connection therewith. For nearly three years it has been the fashion to attribute every disaster, great or small, to some political move of some party or politician. In fact all the ills we had or might have were caused by some particular policy or lack of policy of the other fellow. Now that there is such a healthy improvement these partisans have become tired and in spite of them all, the inhabitants of Uncle Sam's country are enjoying even now fairly good times.

Will they get It?

In our June issue we referred to the trouble a man named Otis was having wi some of his ex-employes in Omaha.

These men had been employed at the Phoenix foundry, operated by this gentleman and when he could not manage to longer operate it without paying for wages and the other things used in that business, he shut down or failed.

It would seem that a chattel mortgage had been given to the National Bank of Commerce there covering everything and this

was not placed on record until the collapse came.

Now forty-one employes, whose claims aggregate $4,298.22, have elected a trustee, chosen a good lawyer and started after the bank, claiming that the paper was drawn three months before and kept off the records by fraud and deceit. It seems to be a great shame that employes who, in these days do not get any too much wages, should be so basely deceived when trusting and as they thought trying to aid a man whose whole history is a record of bad debts, failures, broken promises, etc. Not only were these men injuring themselves, but treating unfairly other proprietors who paid promptly for all they got.

Scrap Heap.

The two Foundrymen's Associations, one East and one West, seem to be cutting out considerable work for themselves, and what is more, they are evidently very much in earnest, and earnestness, by the way, begets confidence, and confidence is most essential where a permanent success is desired.

* * *

The Western Association has had a paper read before it by H. S. Vrooman, entitled "The Future of the Association." Mr. Vrooman's qualifications for handling such a subject lie in the fact that he is a practical foundryman, and his business is such that he is brought into contact with the foundry trade perhaps as closely, if not even more so than any other member of that society.

* * *

In addition, he is and has been an enthusiastic member of the association from the start, and is well acquainted with all the conditions and any criticisms that may have been made looking to the society's further prosperity.

* * *

He thinks permanent headquarters a sort of home for association and its friends is the first great requirement, and he also seems to believe that a division of the membership is needed for many reasons. The divisions, it will be observed, are to be Active Associate and Honorary, and finally he suggests that the association get right down to business and grapple with some of every-day problems to be found in foundry management.

* * *

So far Mr. Vrooman made no mistake, but the question is, could he not have gone farther?

* * *

Is it not a fact that too much attention has been given to the discussion of theories and abstruse scientific questions that have only mistified rather than helped the work sought to be done.

* * *

Everyone who has done or tried to do anything to help educate, inform or entertain those who attend these meetings is deserving of praise, but there have been too many "fancy dishes" and a scarcity of the "substantials."

* * *

If, for instance, the association would take up in good earnest the apprentice question, and formulate or attempt to formulate a practical method for supplying the foundries of the country with a supply of competent mechanics, they would be doing the whole foundry business a substantial favor.

They would discover that American foundries as a rule are not making any longer the high-grade mechanic needed to turn out the best work.

* * *

And they would find some of the reasons.

They would find that the union or unions have nothing to do with it as is sometimes stated. These latter have enough to answer for without throwing everything at their door. They will be blamed for the low price of casting next; but it would be discovered that the smart, intelligent American boy can find more profitable, congenial employment than working in an iron foundry, where he will receive $2.50 a day, more or less—generally less—after he has served several years apprenticeship.

* * *

To come into a shop and work hard during the early portion of the day, and harder during the latter portion, pouring off, amid smoke, steam, heat and dust, with the thermometer over a hundred, his lungs full of dirt and his face as black as a foundry, is not an edifying or encouraging prospect, and the boy simply chooses something else.

There is a greater scarcity of molders to make machinery castings than any other branch of the business, because the others are now "specialty" work, and the ranks of the machinery molder are recruited from the ranks of the specialist, with the result, as Mr. Ramsey Jones pointed out at the last meeting of the Western Association, that good molders are hard to get, and those working at the business seem far below the standard of twenty years ago, though more is expected and needed from them.

* * *

Space forbids us referring at length to the proposition of the Philadelphia Association to form a national body, but the idea has much to recommend it, and if gone about in the right way will doubtless accomplish much good.

Krank's Korner.

Wanted—A foundry foreman. That is what two advertisements read. One who can push men gently, said one. One who can rub men the right way, said the other.

It recalls to my mind how on several occasions in my career I have run against foremen to whom gentleness was unknown. I can to this day feel that surprise which came over me after a heated argument with a foreman, whose pushing became so violent that I found myself in the middle of the street, outside of his jurisdiction, before I could get a chance to explain my motives.

* * *

The primitive way of employing for foreman a person who is capable of vanquishing any one of those under his authority, who can lick any man in the gang, has been a costly experiment to many an employer. It has been and is one of the chief causes of labor disturbances. We are continually advancing intellectually, and as we do so, we will expect, if there is a difference of opinion existing between us, to have an appeal made to our reason. We will more and more rebel against the authority which is able to assert itself only in brute strength.

* * *

We can conceive that men may for a while be so placed, that they will make no open remonstrance against indignities heaped upon them, but men who will take a shower bath of threats and abuse daily for any length of time are disappearing. The bulldozer as a foreman is a pronounced failure. It has been proven that intelligent workingmen are the most economical to employ, and none of these will work in a shop where they are compelled to wade knee deep in a torrent of profanity issuing from the interior of a piece of humanity, whose only claim to ability as foreman may be the abject terror in which he can keep those under him.

* * *

There are different ways of pushing men gently. Each one will want to be rubbed according to his own notion of the way his feathers ought to hang. The foreman that can suit all of those under him, if he has any number, is a jewel. It is a quality only obtained by experience and age, by freely mixing with and making a study of humanity and its oddities in general. It is a sort of mind reading. If I was called upon to rule a man the right way, my first move would be to keep my mouth shut and let him do all the talking. Most people will show their weak points if given a chance to do so.

* * *

Get among a gang of molders at the noon hour when they are "running off a heat," and notice how soon a number of them will show their vanities. Here we have Mr. Jones, his vainglory is shown by his claim of having put up the biggest day's work in the Cumberland district. Would I be rubbing him the right way by acknowledging my great regard for him as the champion hustler of Irondom? Would I be able to secure an increased amount of work from him by expressing it as my belief that nobody else could get such a move on themselves? Would his vanity continue indefinitely to compensate him for his extra exertions?

* * *

In the average foundry it is difficult to say who does the biggest day's work. Mr. Day may put up six molds of a certain kind, and Mr. Night only five, yet that does not say that Mr. Day is the best workman.

Before the product of two molders can be compared it is necessary to compare more than the number of castings they make. It

is not only bad castings that must be counted, a complete review of the time occupied in the clipping room and machine shop on the work of each man would often reveal the slow molder as being the most efficient.

The speedy molder has a tendency to keep the chipper busy. A small fin here and there, a parting badly located, a gate roughly cut makes work for the hammer and chisel. The casting will be just as good, but there is a wide difference in the cost of cleaning castings from different molders working on the same identical job.

* * *

It is generally understood that a workingman does his best when he does all that he is able to do. He will not then sacrifice quality at the expense of quantity, nor will he neglect quantity for the sake of nickel-plated quality. But in actual practice we find the best molders taking it easy to avoid "killing" the job, while the average day's work is high enough to keep the less competent men on the run, and in many instances these are compelled to shut their eyes as to quality for part of the day.

* * *

It would be unreasonable to expect one molder to produce more than another one for the same price. Yet if every molder did his best there would be a difference in their output, and there ought consequently also to be a difference in their remuneration. And here comes in the only successful solution of the problem, "How to rule men the right way?" Pay them for what they do.

* * *

You may feed a molder a large amount of taffy after doing a big day's work, but it is the poorest kind of a remedy for tired limbs. You may slap him on the back and tell him that he is a royal good fellow, but that will not procure him a good supper. You may work on his vanity and he will be contented for a while. Recognize him substantially, pay him for what he does, and he will be satisfied forever. Flattery is too thin to expect solid work from.

* * *

The ability of a foreman to push men in the foundry is for the greatest part controlled by his employers. A tight purse string, an expectation that something is going to come from nothing but wind, is a poor lubricant.

The Molder's Convention.

The Iron Molders' Union, at their recent Chicago convention, made a few radical changes in their constitution, among them being the establishment of a sick benefit fund that will entitle the members to $5 a week in case of sickness; the collection of dues weekly, and their increase to twenty-five cents per week.; the appointment of an editor who shall give his time to the journal which it is intended to enlarge and improve, and the granting of a general amnesty to members and local branches who for any reason may have been suspended or expelled.

The following were the officers elected:

Martin Fox, Covington, Ky., President.

Joseph F. Valentine, of San Francisco, First Vice-President.

M. J. Keogh, of Troy, N. Y., Second Vice-President.

Charles J. Duke, of Norwich, Ct., Third Vice-President.

E. J. Denny, of Cincinnati, O., Secretary.

J. G. Weaver, of Cincinnati, Assistant Secretary.

R. H. Metcalf, of Cleveland, O., Financier.

Wm. Henzel, of Albany, N. Y., Treasurer.

Trustees and Executive Board:

J. H. Widdowfield, of Brooklyn; John Campbell, of Quincy, Ill.; P. Enright, of Chicago; M. B. Savery, of Brantford, Ont.; F. R. Rogers, of Atlantic, Ga.

The Driver.

H. HANSEN.

When I first heard molders allude to the foreman as the driver, I thought the designation very much out of place, disrespectful and impertinent language to use about their superior. I had then had but a limited experience; my range of vision was short; I thought all foremen were good, because all of those with whom I had been in contact till that time were men as well as bosses. Changing around to a few shops soon dispelled this happy illusion, that all foremen were agreeable companions however, and I

was forced to acknowledge that the word driver is the only proper designation that can be made of a certain number.

The best, the most reasonable foremen I ever met were those who were themselves capable of doing any day's work they required of anyone else; who were willing to do anything they asked others to do. I am glad to be able to say that for these foremen, men worked with willing hands and a resolution to do their best, something that is seen under voluntary conditions only. Need it be said that such service is far superior to that obtained by driving men.

I have always felt a certain high regard for the foreman, who has been through the mill himself, has obtained his experience in a practical way, and uses this as a gauge to caliper the endurance of others. I have always admired the foreman who condemns nobody's work or its faults until he has made himself familiar with it, and the conditions under which it was produced. I have a great amount of faith in the boss who can look upon adversities with a steady hand and a cool head, without making a circus performer of himself.

The foreman who can in a calm, deliberate manner call a molder's attention to his faults is the very best instructor. Such a man will not bawl out in a fog-horn voice, "See here, Bill. You make another bad casting and I will kick you out of the shop," and finish up with about a yard of blood-curdling oaths. Such a foreman will draw the attention of Bill without notifying the rest of the shop to stop work, and Bill will remember what is said to him, too, because there is no profanity attached to this advice, that is everlastingly presenting itself, and Bill's nerves will not be so shocked by good, wholesome, sensible information, delivered in a way dictated by common sense, but that he will be able to do better. Compare this way of winning the respect of men with that offered by the driver with his copper-lined, filthy mouth, his termayant disposition, with his supercilious actions, and judge which you think would be the most efficient.

A driver uses no judgment or follows any course compatible with reason. He shoves the man who turns out a big day's work as well as the one that shirks. He crowds on a full head of steam and uses it against everybody regardless of everything. The man who tries the most to please a driver is the one that for all his pains will receive the worst treatment. As a rule it is men who, in their own language, don't give a snap for anybody, upon whom he bestows his most considerate attention in an attempt to conquer these who feel inclined to keep aloof and resent undue interference. It is characteristic of the driver that he is unable to discern what constitutes a day's work. His ideal must always have his muscles in motion.

A driver is not a foreman. His motto is always to get the molders to make one more mold per day, no matter what their output is. He does not as a foreman appeal to their intelligence by showing them where they may make a saving of time to accomplish this. His reasons for insisting on increasing a day's work seems to be purely personal, for he never divulges them. He wants things done because he says so, and that is all the reason he can advance.

No one should entertain any ambition to fill the position of a driver. To become such, one must abandon judgment, kindness and conscience; must look upon men as being without all intelligence, and proceed without any regard whatever for humanity. A driver is not a foreman—is without the least semblance to such. Fortunately he is seldom successful as a manager. He stands without the confidence and esteem which we accord even to those who differ with us in opinion and principle. The length of time he will be served by anyone who has not been hit on the head with a brick in their youth is limited to the pecuniary needs of the individual who must have a stake. We may be thankful that drivers and the different specimens of such are scattered as thinly as they are, and that instead we are able to designate the great majority of men who are entrusted with the responsibilities of foundry managment as foremen. It is unjust to call all foremen drivers. They do not deserve it, no more than a driver deserves admittance to the good things in the hereafter.

The Phoenix Iron Works Co., Cleveland, O., have opened an office in Chicago at 1430 Old Colony Building, with H. A. Callan in charge.

H. S. Vrooman.

H. S. Vrooman was born in Indianapolis December 15, 1863, and later on moved with his parents to Bloomington, Ill., where he attended the public schools until he was 16. Abut this time he thought he would like to become a molder and began to serve an apprenticeship to the Bloomington Stove Co. After the completion of his apprenticeship, in common with the majority of young molders, he became possessed with a desire to travel, and at the age of 20 "took the road," working in Cincinnati, Indianapolis, Quincy and St. Louis. Always of an ambitious turn of mind, he later on entered the employ of the J. D. Smith Foundry Supply

Co., of Cincinnati, as a traveling salesman, where he remained for some time. From here he went to take charge of the Somerworth Western Mnfg. Co., at Bloomington, Ill., as foreman. In August, 1891, he received and accepted the offer of a position with the Garden City Sand Co., at Chicago, in charge of their molding sand and foundry supply department, where he has remained ever since. Mr. Vrooman takes much pride in the fact that he is a practical foundryman, and THE FOUNDRY only regrets that there are not more men in the ranks who, like him, are possessed of a determination to improve themselves. Few molders in America or few foundrymen are better posted or better read on all subjects concerning their business, and we doubt if any have a more complete library of books, etc., on foundry subjects than he.

Naturally he has always taken much interest in Foundrymen's Association matters and has served the Western Association for one term as Treasurer with credit to himself and it.

His paper on the subject of popularizing it is doubtless the result of impressions received while visiting foundrymen in Chicago and the West.

A Job of Foundry Work.

At the Deering Reaper Works, in the northwestern manufacturing district of Chicago, they finish a reaper every minute of the working day, on the various shop buildings located on the 52 acres of inclosed shop ground. These buildings include machine, foundry, and wood shops, assembling, storage and shipping buildings; a large twine factory, where hundreds of girls spin the twine used to tie the bundles of grain turned off the Deering reapers when at work in the harvest field, and the large office buildings at the southeast corner of the works.

To describe these works in detail would not be possible just now for many reasons, and I choose, therefore, a foundry job that is, I think, especially interesting.

All machines for farm use are exposed to the weather, and to dust; they must in all cases be sold at very low prices; they must also be extremely good; they must be very durable, when their service is considered, and they must also, in the case of the self-binding reaping machine, perform with absolute certainty complicated operations on material very difficult to handle, and constantly varying in condition, quality and quantity. Thus the self-binding reaper must be able to go into any field of grain, tall or short, light or heavy, and convert the standing crop into tied bundles of uniform diameter, ready for the shock or stack. These are very hard conditions; the cost and the dust alike forbid close-fitting and delicate workmanship; in fact, machine work must be in every instance reduced to the lowest possible limit, and yet the parts must be thoroughly interchangeable, and must be capable of great endurance under very trying

conditions. These exactions point at once to foundry work of the very highest class as the first requirement of the Deering establishment. The gray and malleable iron castings which go to make up a Deering reaper must be uniformly true to pattern, and perfect in every particular; they must weigh the very least possible, hence they must be not only of the most suitable material, but of uniform excellence; since the best is only heavy and strong enough for its duties, anything less than the best would be worse than useless, as the margin of safety in all agricultural machines is reduced to its lowest economical point. Hence again, the skin of the castings must be cut as little as possible, no less for the sake of cheapness than for the preservation of strength, and the avoidance of rubbing surfaces to be lubricated with grit and oil in about equal proportions while at work in the dry and dusty harvest field. Thus it is clear the very best and cheapest foundry work which can possibly be made, must always be found in the large farm tool factories, of which the "Deering" is one of the largest in existence.

Fig. 1 shows a lot of "ground wheels," or "road wheels," or "bull wheels" for the Deering reaper. All of these names are in use in the shops, but as the wheel runs on the ground, "ground wheel" would seem to be a correct descriptive name for the piece. These wheels weigh 180 pounds each, and are 33 inches outside diameter by 9¾ inches face. They are molded in the Deering works for 16 cents apiece, and the price and the work done, and the elaborate and costly tools in making this wheel so cheaply, form a very instructive example of the possibilities of the iron founder's art. They are made for a low piece price. They are very well made, each wheel being, within very small variation limits, an exact duplicate of every other, and the hands employed on these wheels make very good wages. A gang of six men, with a crane carrying on its jib an air hoist trolley, put up 160 molds per day; at 16 cents per mold this makes the six hands earn $25.60 per day, which is $4.25 for each of the gang of six molders, share and share alike, as there is no foreman or leading hand, all ranking as equal. The average day's work is about eleven hours, however, so that these men have something less than 39 cents per hour. This is very much above common foundry wages, but it is quite common in factories demanding a very large output per square foot of shop floor to pay piece prices, which enable the rapid workmen to earn good money by diligence.

Fig. 1

The floor on which the Deering ground wheels are molded is wide enough to take a row of eight wheel flasks. The men who

mold the wheels do not pour them; the pouring is done by pourers, who do nothing else but pour. The iron begins to come down about 9 o'clock, and pouring begins when the molders have four rows of eight flasks up the flasks, so that the molders have nothing to do except to cut the sand over and put up the molds. This ground wheel floor is covered by two light traveling cranes, one for the pourers, which only carries a

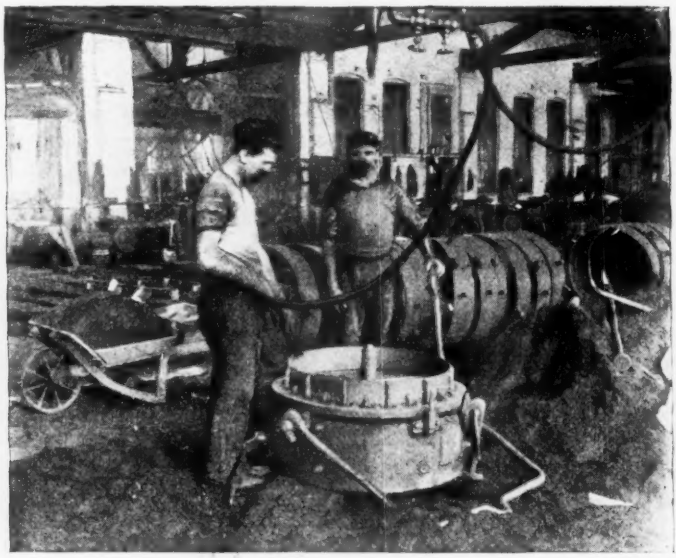

Fig. 2

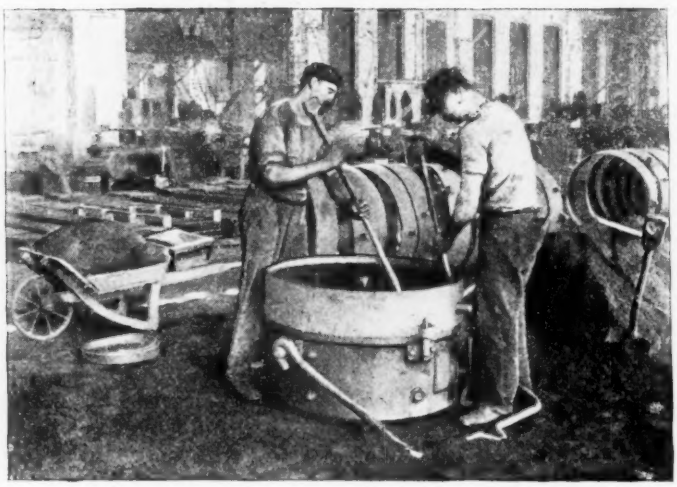

Fig. 3

each put up, and keeps about four rows behind the molders all day; the pourers pull the copes off the poured flasks at the proper time, and also shake out the work and pile trolley for the chain and ball for the ladle holding about 1,500 pounds of iron, and pouring eight wheels at one filling. The molder's crane trolley carries an air hoist,

and the air is also cocked to a blowing hose to give a hand blast for blowing the pattern clean, as shown in Fig. 2, instead of brushing it clean, the air blast being much better and quicker than brushing.

These ground wheels are spoken of as "machine molded," but "machine molded" is a very elastic term, and may mean either the use of an elaborate machine which rams the mold or presses the sand around the pattern in the flask, and also withdraws the pattern from the sand, or it may mean merely that the follow board is provided with means for mechanically drawing the pattern in to the depth of the follow board, provided with internal mechanism, connected with a shaft journaled in the cylindrical walls of the follow board, and having a projecting squared end to take a wrench, by which the shaft may be partly turned when it is desired to pull the pattern down through the top of the follow board, or to push the pattern up through the follow board so that it will stand as in Fig. 2, wholly above the flat follow board top. Means are provided for guiding the pattern as it travels up and down in this hollow cylindrical follow board, which is not called a follow board at all, but is spoken of as a "molding machine." There are two of these

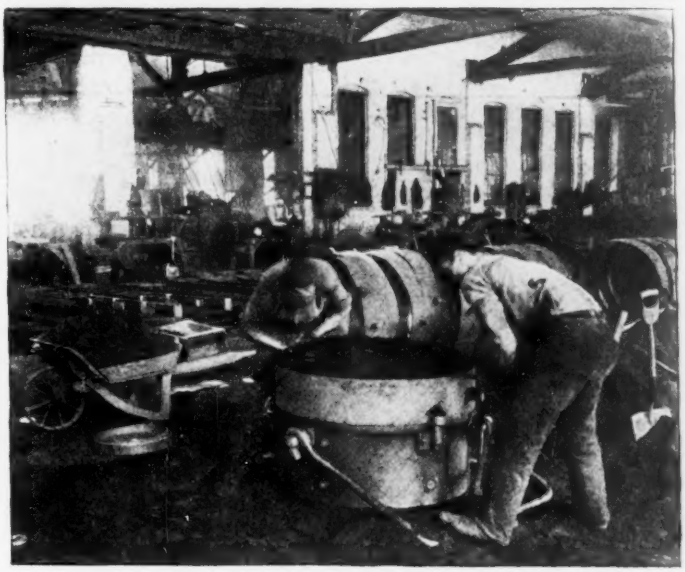

Fig. 4

so that the pattern is machine drawn, while the filling and ramming of the flask is done altogether by hand. This last is the case in this ground wheel job. The "follow board," as very clearly shown in Fig. 2, takes the form of a hollow-flanged cast-iron cylinder having an inside diameter greater than the outside diameter of the wheel pattern, so that the pattern can be drawn down into the follow board, which is about twice the depth of the pattern width. The top of this round follow board is finished flat, and is also cut to the exact shape of the wheel rim, arms, and hub where the two halves of the pattern join, and this follow board is further molding machines, each carrying one-half the wheel pattern; one machine makes the nowel, and the other the cope of the wheel mold. The one shown in these figures makes the nowel. The molding machine is hung on trunnions in a high bail, as also clearly shown, lying down, in Fig. 2, by which bail the machine and half mold which it carries may be readily hooked to the air hoist piston rod, and lifted and turned over as occasion requires.

In Fig. 2 the machine has been sat down on the floor near the sand heap, and by turning the shaft mentioned the pattern has been pushed up through the top of the fol-

low board, which it exactly fits, and the molder is blowing the pattern clean with air blast at 80 pounds pressure, which is very noisy as well as very effective. All that follows, except Fig. 6 refers to the nowel only, the cope shown in Fig. 6 as being closed on the nowel, being made on another similar molding machine by others of the gang of six hands on the job. These pictures were made at the noon hour, two of the men putting up the nowel for the convenience of the photographer who found it quite impossible to get pictures in the regular course of the work. The Deering foundry floors are far too wide to be very well aware that he must have a full day's work off that particular floor.

Thanks are herewith tendered to all, to the head foundryman and to the molders, drawing the line, however, at the pourers with their 1,500-pound ladle of melted iron in the close rear of the artist, as before mentioned and very warmly remembered.

Fig. 3 shows the circular nowel, half of the flask in place and the men in the act of ramming it up. The flying minutes forbade more than two trials for a picture of the spirited action shown by one of the molders in "tramping off" this flask, and both proved, unfortunately, failures.

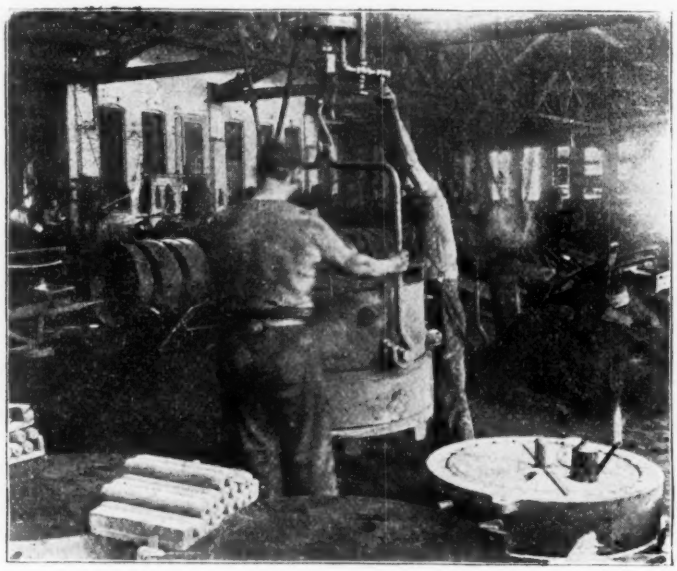

Fig. 5

lighted from the sides, and as there was only 30 minutes' time for all of the pictures, and the artist had a 1,500-pound ladle of melted iron in very sensibly close rear proximity while his head was under the focusing cloth, these pictures recall vivid personal memories. That such pictures could be taken at all under the circumstances speaks volumes for the modern development of photographic apparatus adapted to use by those who are not professional photographers. There was a combination of darkness, flying sand, and melted iron, with hungry workmen to pose, and a foundry boss who, while anxious to oblige, was perfectly

Fig. 4, both the men striking off the bottom of the nowel with an iron strike, was clearly a success, however, as the engraving shows.

In Fig. 5, the whole job is swung by the bail in the crane; a wooden follow board has been clamped to the bottom of the nowel, and the machine and the nowel turned on the machine trunions in the bail, so that the machine is now on top, above the nowel with the follow board or bottom board, rather, clamped to its under side; and one workman steadies the mold and guides it into its place in the row, next the last one made, which is shown at the right, its top

surface dusted with flour, the hub core set, and a blazing oil lamp sitting on the top of it. To the left of the middle front is shown a pile of hub cores, beautiful specimens, as perfect as if turned.

The core making at Deering's seems wonderfully good all through; the core boxes, many of them quite intricate, are fine examples of design and construction, and the vast number of cores required gives the core makers a marvelous expertness. Indeed, every detail of the foundry work at the Deering shops was carried out to an admirable degree of perfection.

Fig. 6, "closing up," shows a cope made by the other men of the gang on the other

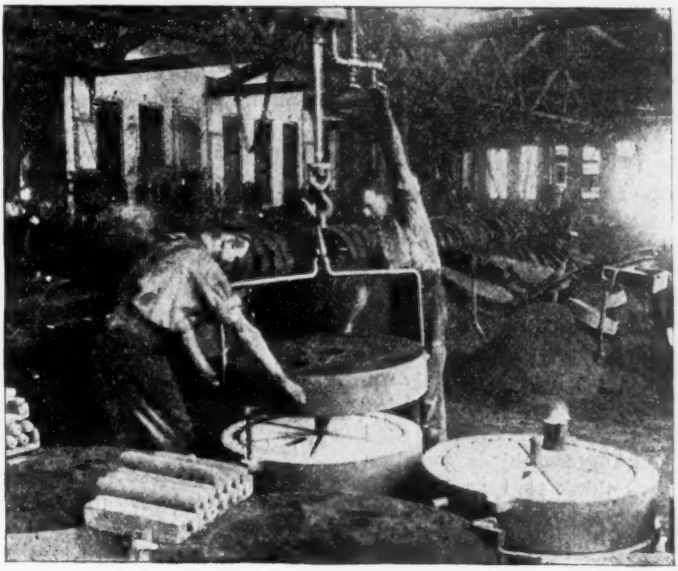

Fig. 6

molding machine, swung by its bail in the air hoist hook and being guided on to the flask pins as the man with his hand on the air valve wheel lets the cope down to place on the nowel, which has been duly floured on top, and had the hub core set in the middle.

These wheel patterns are, of course, finished all over to absolute perfection, so that they draw through the metal follow board, or draw plate, with such certainty of not disturbing the sand that the molders did not even look at the mold after drawing the pattern. They simply put the wrench on the squared end of the machine shaft as soon as the lowering of the nowel, shown in Fig. 8, was completed, gave the shaft a half turn, and snatched the machine up with the air hoist and raced it back to the sand heap, turning it over as they went, and in an instant it was down on the floor; the shaft had another half turn bringing the pattern up on top as in Fig. 2, and the horrible hiss of the air hose blowing the pattern clean was heard again.

One hundred and sixty flasks put up in 660 minutes of working time is one flask for every 4⅛ minutes; that is to say, every 4⅛ minutes for 11 hours this gang of six men makes the cope and the nowel, flours the molds, sets the core, and closes the flask and is back at the sand heap ready to begin another. Compare this with the procedure of molding such a wheel in a jobbing foundry where it would take half an hour to hunt up a flask and get it on the floor and clay washed ready to begin work. The cost of the Deering patterns or "machines" for molding this ground wheel cannot be given; it may have been as much as $400, perhaps not half that; tool making and pattern making cost various prices; a trip through the West will convince any man of that fact. But suppose the patterns cost a dollar a day, and the iron in the ladle cost 6½ mills per

pound, which is not far out for a guess, and the pourers cost $5 a day for the two of them, this gives only $29.10 for labor and wear and tear of tools per day, and makes these big 180-pound wheels cost only $1.36 each, short cost, to the Deering Company; and it would be difficult to find items to bring the long cost or "all in" shop cost to more than $1.50 each, or a good deal less than one cent a pound for this elegant job of founding.

This is not nearly so cheap as some work noticed and noted, but it is cheap enough, probably, to make some manufacturers think twice before they put the matter out of mind altogether.—American Machinist.

Foundrymen's Association.

The Fiftieth monthly meeting of the Foundrymen's Association was held at the Manufacturer's Club, Philadelphia, on Wednesday evening, August 7. Owing to the excessive heat the attendance was very light, there being less than a score of the members present, when President Schumann called the meeting to order.

The reading of the minutes of the last meeting was dispensed with, and Secretary Evans then read the report of the executive committee, which was as follows:

"This is the fiftieth meeting of this association, the only break being the July recess, which is only one meeting lost during the past four years. Your committee is well pleased with the progress this association has made, and we think that as business improves, our association will increase in members as well as the interest taken by the members.

"It is now proposed to hold a National Association of Foundrymen under the auspices of this association in this, the Manufacturer's Club. There are a number of questions that should be talked over that are of interest to every foundryman. We do not think it would be advisable to make a price at which castings should be sold, nor the price of labor. The position and facilities are so varied that it would be impossible to come together and make a rule establishing the price of castings, or the wages paid that would be acceptable to all. Therefore, if this association should attempt to interfere, we feel quite confident we would lose the power for educational purposes that we are now holding, as such interference would undoubtedly end in a strike.

"We believe the questions of the hour should be talked over and discussed, the idea being to post the foundrymen upon new and interesting subjects that they may better know how to conduct their own shops.

"Another question that may be agitated is the apprenticeship that was so common years ago. There is really a scarcity of molders—that is, good molders—in this vicinity, and it is time to make new ones as quickly as possible that shops may keep up to the times. We propose to go on as we have been doing, by procuring papers upon different subjects, hoping it might be acceptable to the members and others who take the time to come to our meetings. The foundry business is in better shape than it has been for two years. It is rather spasmodic; that is, busy one month, while the next may bring a reduction in the output. We have heard where prices of castings have advanced from one quarter to a half cent per pound, which is more than enough to cover the extra cost of fuel, labor, etc., and we think if the foundrymen would be a little more independent and not so eager to fill the shop at low prices they would gradually receive better figures."

After the reading of this report, expressions of opinion as to the plans for the proposed National Association were called for. Messrs. Faber and Wood thought that in inviting foundrymen to attend, the Philadelphia Association should announce some topic of general interest to be discussed, that those invited might know beforehand how important the proposed convention was destined to be. Mr. Faber thought the apprenticeship question was a very important one, and Mr. Wood after urging the preparation of an attractive programme moved that a committee of five be appointed by the president to formulate ways and means. It was afterward suggested that the president and secretary be included as ex-officio members of the committee. The following committee was then appointed: Messrs. Walter Wood, Thomas Devlin, Thomas Glover, J. Sellers Bancroft, and W. H. Pfahler. The committee was requested to meet for organization the following day. Secretary Evans then read extracts from a paper read by Mr. Vrooman before the Western Foundrymen's Association at its last meeting, and after further discussion of minor importance the meeting adjourned.

CAST IRON.

By W. J. KEEP.

It is the intention to give the foundry foreman an opportunity through the medium of this journal to ask any question he may choose regarding cast iron or foundry mixtures or any peculiarity in his castings, just as though we had met together for this purpose in his office.

It is not intended to publish the names of those who ask questions, and we may not publish the questions in the form in which they are proposed, but we shall frame the answer to benefit the largest number of our readers. Each person proposing a question must give his name and address, as we may wish to ask for additional information or we may choose to answer the question by letter, if it is not of general interest or if it requires more space than we can spare.

A Foundryman's Troubles.

Q. We find such a wide difference in the shrinkage and strength of our test bars on different days, and during the different parts of the heat, that we do not know what to do.

A. If the iron varies you want to know it, don't you?

Q. The grading of the pig iron varies so that I do not know where I am.

A. Use more kinds of iron and then the variation in the grading of any one kind will have less effect on the mixture. This is the reason that it is not safe to make a mixture with only two or three brands.

Q. (Showing sample) That grain is very light colored and is very close and the sand burns into the surface, do you think it needs more silicon or is there too much?

A. The casting is 3-16 of an inch thick. You can run the silicon up to 3.25 per cent and get a smooth surface and a darker and more open fracture, and in a casting of that thickness silicon will increase its strength.

Q. Is there danger of getting too much silicon; will not too much make the coating brittle?

A. No, not in your business. Irons with high silicon cost too much. Your ideas of economy will cause you to use too much low silicon iron to get the silicon in your castings above 3.25 per cent. Up to 3.50 the castings will be softer, stronger and less brittle.

Q. No 2 sofe southern iron is cheap enough?

A. Yes, and the silicon is supposed to be about 3.50 per cent, so if you used all No. 2 soft you would not get silicon too high for your castings, but No. 2 soft at most furnaces is the scrap pile of the yard and anything of a light color and of a close grain is thrown into the No. 2 soft pile, so you are not quite so sure of it as you would of No. 1 soft, which is regularly graded.

Q. How will iron with 3.25 per cent silicon act on tools?

A. The iron will be as soft as you can make it.

Q. How can I tell when the silicon is right for my castings?

A. A shrinkage of .125 inches per foot of a half inch square test bar indicates 3.50 per cent silicon and there can't be any mistake.

Q. You don't think I need any analysis?

A. It won't do any harm, but the iron the next day will not be exactly the same. Use quite a number of different irons and make test bars each day; if your shrinkage gets above .135 increase the irons that contain most silicon until your shrinkage runs regular.

Q. Don't you think certain combinations of sulphur, phosphorus or manganese will increase the shrinkage and hardness?

A. What if they do, you can't help it, and a little extra silicon will bring the shrinkage where you want it, in other words, it will bring the quality where you want it. If you can always counteract an evil it does not make much difference what caused it.

If you were making heavy castings it would be different, but your castings are all light.

DEPTH OF CHILL.—An increase of silicon will make castings soft and this will be indicated by a low shrinkage of a half-inch test bar. Generally a low shrinkage is accompanied by a light chill. Chill is produced by a peculiar composition of the pig iron independent of its softness. This tendency is received in the blast furnace and some ores produce chilling iron. The men who sell you iron can tell you which are the chilling and which are the non-chilling irons. If they do not you can test the mat-

ter. Find the depth of chill of the mixture as you have it, then for a few days leave out one of your irons and put in as much extra of one of the other brands. If the chill remains unchanged it is neither of those two irons which causes the chill and if it increases or decreases you can tell which of the two produces the most chill—after a few trials you can locate the iron, and need not buy any more.

MILLING SPRUES.—Where the castings are mostly light the sprues will represent 40 per cent or more of the melt. If you are melting 16 or 18 tons in a cupola of 5 feet inside diameter, or a less amount in a smaller cupola, it may pay to mill the sprues so as to get cleaner iron and to have less slag in the dump. If you have a larger heat it is cheaper to slag the cupola, and use about 40 pounds of limestone to each ton of iron to cause the slag to run freely.

Deaths.

Frederick Haensgen, for ten years foreman for the Dearborn Foundry Co. at Chicago, Ill., died at his home in that city July 19.

James F. Allen, of Worcester, Mass., died there suddenly recently. He was formerly in the foundry business there.

Seth W. Bishop, of Hartford, Ct., died at his home there July 30, aged 74. He was for twenty years foreman of Pratt & Whitney's foundry at Hartford, Ct.

The death suddenly of E. F. C. Davis, President of the American Society of Mechanical Engineers, on August 6, is a peculiarly sad one for all concerned. Less than three months ago his immediate predecessor in office, E. B. Cone, died, and it was while pleasure riding in Central Park that Mr. Davis met a sudden death. His career was one of steady progression, and he had held several important positions, chief among them being superintendent of the Philadelphia & Reading's shops at Pottsville, Pa., where all the work for their fifty collieries was done; then superintendent of Richmond Gas Works, and at the time of his death superintendent of C. W. Hunt & Co.'s extensive works on Staten Island.

Personal.

A. Sorge, Jr., M. E., for some time past superintendent of the foundry department of Fraser & Chalmers, Chicago, and whose knowledge of the business and previous experience we referred to at length in THE FOUNDRY for April, 1895, has opened an office in room 1533, Marquette building, Chicago. He intends to devote his time to the business of serving as a consulting engineer to the foundry trade, and those in need of any information on subjects connected with the equipment and running of foundries, or who desire expert assistance in connection with any problem that may arise in their management, will find Mr. Sorge available. This is an entirely new field and one that has needed attention for some time, and this gentleman's well-known experience and ability is a sufficient guarantee that he will succeed in the original step he has taken.

C. C. Knauss, formerly with the Bethlehem Foundry & Machine Co., is leaving that company to accept a position with the Urbana Manufacturing Co. at Urbana, Ill.

Fires.

Wright & Adams' foundry at Quincy, Ill., burned the last week in July.

The foundry of the Cumberland Nail & Iron Co., at Bridgetown, N. J., has been burned.

Le Baron's foundry was burned at Middleboro, Mass., July 15. Loss $35,000. It was very busy and will be rebuilt at once.

Pratt & Cady suffered from a $1,000 fire in their brass foundry recently at Hartford, Ct.

J. Wodsedalek & Co. lost their foundry by fire August 6. Loss $10,000.

The Foundry owned by Koehles Bros., at New Albany, Ind., was burned recently.

Farnham's brass foundry in Cleveland, O., suffered from a $4,000 fire July 25.

The Lawrenceville, N. Y., foundry and machine shops was destroyed by fire a few weeks ago.

The Union Iron Works at Decatur, Ill., were destroyed by fire August 6. Loss $50,000.

The foundry of the Knowles Steam Pump Co., at Warren, Mass., was destroyed by fire August 9. It is the third fire the company have had, and there is some prospect of their removing to another locality. Loss $175,000.

James Chalmers.

The Adventures of a Tramp Molder.

BY W. EDWARD.

Chapter XIX.

I thought I would have a "cinch" on a job by being on hand as soon as the whistle blew for seven o'clock, but when I got to the shop I found nearly a dozen men waiting to "strike" the "boss" as soon as he showed up. The first man I met in the shop was "Joe" Shaw, and, after shaking hands, I asked him what show there was for a job. He pointed to the crowd standing around and said that there had been a mob like that hanging around the shop every day for a week, but there would be no harm in "striking" the "boss." "Jack" O'Neal was the foreman, and as soon as he came in I told him I had come for the job advertised in the papers. He laughed and said that he didn't need any molders and haden't advertised for any; then I pulled the paper out of my pocket and showed him the advertisement. "Oh," said he, "that is one of Makie's tricks"—Makie was the superintendent—"molders are fools to pay any attention to an advertisement like that; don't you know, if we wanted any molders, that we could pick up all we wanted without advertising for them?" He explained that Makie made it a practice to advertise for molders and machinists every other week, and the men nearly drove him crazy running after him for a job. He then asked if I had not worked over in the other shop, and, on my replying in the affirmative, he advised me to go over and strike "Billy" Aldrich, as he understood that they were hiring men in the "old town" shop. So I "chased" over to "old town" to see if I could strike anything there. "Billy" was glad to see me, but, while he had plenty of work, the shop was full and he had two "cubs" working out in a "dog-house" in the yard, so there was no room for me. He said if I could manage to lay around for a week he would try and make room, as he had plenty of work on hand, but I told him I had no money to hold me up for a week, and I looked too tough to go up to my old boarding-house and "stand them off" for a week's board. Then he told me to go back and tell O'Neal that if he would give me a job for three or four days he, Aldrich, would try and make room for me.

It was nearly noon when I got back to the Perkins shop and delivered my message to O'Neal. On hearing it "Jack" said he would help me out with a few day's work, that he had sent for his brother and was holding a floor for him, but if I wanted to work until he came I might start in that afternoon. This suited me all right, so, when the whistle blew for 12 o'clock I followed the crowd to Mrs. McDonald's boarding-house and made arrangements to board there, going to work after dinner. I helped Dick Foley on a column that afternoon and the next morning "Jack" put me on the oil-box floor. "Serant" Hartman had been making the boxes, but he had had bad luck for three or four days and "Jack" put me on to see if I could do any better. I worked the balance of the week on boxes and managed to save every one. In the meantime "Jack's" brother came, but "Shorty" Rudolph quit the same day, so there was still a floor for me, and "Jack" kept me on the boxes. On the following Monday morning I was out in the chipping room and overheard O'Neal tell the chipper that he had a man who could make boxes and he was going to keep him at it. I felt very easy when I heard this and I was not a little surprised when the chipper came in the next morning and asked me to go out and look at my boxes, as three or four of them were bad. I went out to see what the trouble was and found that the bad boxes all had the same defect, there was a little hole on top of the flange which looked like a cold shut. "Jack" came in while I was examining them and I told him I thought it was the fault of the core, that the flange had been made too hard and not vented properly and the iron would not lay to it. He wouldn't listen to this explanation and said I had either gaited them too light, or else the iron was dull. Although I still believed the core was at fault, that day I gated twice as heavy as I had been doing and poured them with good hot iron, feeding them up slowly after the iron had covered the flanges, but the result was the same. When I went out in the morning the first thing I did was to scrape the top of the flanges to see how they had turned out, and when I found that four of them were bad

from the same cause I told "Jack" to either give me my time or another floor, as I did not feel like standing the blame for lost work when I was sure it was lost through no fault of mine. He put me on the brake-hanger floor and put his brother on boxes, but he had no better luck than "Scrant" or I, for three or four days he made the boxes all right, then he began to lose them, just as we had done, so I was satisfied that my idea was correct about the cores being too hard. That is one great fault with most foremen. No matter what happens, the molder is always to blame. Some of them will come in and throw a pattern at you, as if they were throwing a bone to a dog, and order you to make so many off that for that day, sure.

Probably there isn't a flask in the yard that will come within two feet of fitting it, half a dozen core prints may be missing from the pattern, the core maker may have forgotten to make the cores, no matter. The autocrat of the sand heap says to do so and so, and it must be done. Now, O'Neal wasn't that kind of a foreman, he hadn't been a great while off the sand heap himself and treated his men very well, but I am just reminded by this incident of the common failing of most foremen.

As soon as I got work I wrote to my friend in Marshall to express my "grip," as I was badly in need of a change of clothes. The satchel came on Saturday and I managed to get a few dollars from the office to pay the express charges and give me a little pocket money, and that night I had the pleasure of donning some clean clothes for the first time in over three weeks. On Sunday I went over to call on the people where I had boarded when I worked in "old" town, and I was surprised when they handed me a paper which was addressed to me. They explained that the paper had come a few weeks after I left, but as they did not know where I had gone to it had been laid to one side. The paper contained a marked paragraph, which told a long story in a very few words. It was merely the announcement that Miss Belle Strickland and Mr. Somebody-or-other, I have forgotten now, were quietly married at the home of the bride on the 14th of March. When I read the announcement I hardly knew whether to feel aggrieved that I had been jilted in such an unceremonious manner, or to feel relieved over the fact that I would no longer have to worry over an explanation of my conduct of the past year and a half, as, not being able to explain to my own satisfaction, I had doubted my ability to explain it satisfactorily to the girl whom I had promised to marry and whom I had neglected so shamefully. On the whole, I felt inclined to congratulate myself that Belle had chosen to resent my treatment of her and had married a man who would, probably, be better able to care for her than I would ever be, so long as I worked in the sand heap. Thus ended my first romance, and I have been very careful about making any entangling alliances since, not feeling sure, with the roving inclinations I have always had, that I could take the proper care of a wife if I had one. I felt satisfied that it had ended as it did, as a weight of responsibility seemed to be lifted from my shoulders and I felt that I was "foot loose and fancy free" once more.

The foundry at Springfield was one of the worst laid out shops I ever worked in, in fact, it must have been built for a dwelling house or a store room, as no man with any brains would ever build such a place for a foundry. It had originally been three rooms in the shape of an L, and they were connected simply by knocking the walls out. Each of these rooms was about 20 feet square and the roof was not over 12 feet high. It was enclosed on all sides by the office, machine shop, pattern shop and core room, and on a warm Summer evening, when the core smoke began to rise, we were stifled by the smoke and almost parboiled with the steamy heat, so you can imagine what kind of a place it was to work in on a hot July day. Besides the L there was a narrow space between the foundry and the pattern shop which we called the "shooting gallery." There was one floor in this place and it was just wide enough to work a two foot flask and leave room to get in to pour. It was comparatively cool in the "shooting gallery," as it was open at both ends and there was always a draught of air.

"Jack" O'Neal was a pretty good fellow to work for and would not allow his men to be imposed upon. The superintendent—Makie—formerly a carpenter and afterward labor boss at the Vulcan iron works, over in

Carondolet, knew as much about the foundry business as an infant, but like most of his class he was a "rusher," and was thoroughly detested by every man in the shop. The molders all belonged to the Union and it was Makie's play to break up the Union and run a "scab" shop, and for this reason he kept a standing advertisement in the Globe-Democrat for molders, and there was hardly a day but three or four men struck the shop looking for a job. Makie was continually interfering with the men and he and "Jack" had numerous quarrels on this account. My floor was alongside of the office door and if I was a little late with my work Makie would stand in the door with his watch in his hand and time me on a flask. In order to get out more work he had the castings taken out and the sand tempered at night. This was all right for the other floors, but underneath my floor there was a wooden drain and my heap was generally damp enough to temper in the morning without throwing any water on it. When they started to take the castings out at night and cut my heap over it was like mud in the morning and I had to scrape up a lot of dust to make it dry enough to work. After two or three experiences like this I kicked to "Jack" and told the helper just to take the castings out at night and leave me to temper my heap in the morning. Makie happened to be in the shop that night and wanted to know why my heap wasn't tempered with the rest. The helper told him the reason, but Makie told him not to mind me, that he was the "boss" and his orders were to cut over all the sand heaps; if I didn't want to work as he wanted me to he would get some one that would. The next morning my heap was wet as usual and I had put so much dust in it already, trying to temper it, that the sand was rotten and would hardly hold together. As soon as I saw the condition it was in I put on my coat and told "Jack" to give me my time, as I was going to quit. He wanted to know what the trouble was and asked me to try and work it that day, and he would see that it did not occur again. So I got a wheelbarrow and gathered up some more dust to try to dry the heap out so that I could work it. It was nearly ten o'clock when I got my followboard down for the first flask and just as I got started Makie came in. He pulled his watch out, sized up my floor and asked me if I expected to get a day's work, starting at that time of day. I was pretty "hot" and told him to attend to his own business, in words more forcible than polite, and if he had any complaint to make it to the foreman. He answered that he was running the shop and if I gave him any more back talk he would fire me. I had a shovel in my hand and when he said that I made a dive for him, and let a whoop out of me, like an Indian on the war path. I scared him so bad that he run through the office and clean out to the street before he stopped, but I was satisfied that he would not attempt to interfere with me again, and I went back to my floor. I, of course, expected to be fired, but I thought I would go on with my work until "Jack" told me to quit. In a little while Makie got over his scare and came into the shop, looking for "Jack" to complain of my treatment of him, and giving orders to fire me at once. O'Neal tried to patch matters up, but Makie insisted that I should go, and finally "Jack" told him that if I went then he would go too, as he couldn't run the shop if Makie insisted on interfering with his men. Makie was not in a position to let "Jack" go at that time, so nothing more was said about the matter, but after that Makie was always as polite as possible when he had anything to say to me. It don't do to let a man ride over you rough shod, no matter what his position is. I have found by experience that a "boss will always respect you if, when he is in the wrong, you stand up and take your own part, and lick him, if it is necessary to do that to show him that you don't intend to be imposed upon.

They only paid once a month in this shop and, as I had no money to commence on, it was pretty tough for me to hang around without a cent in my pocket until pay day. After that, though, we made things hum. There was a jolly crowd of boys working there at that time and we managed to keep from getting lonesome. One night five of us went out to a dance and loaded up on "dog-fennell" whiskey. It was nearly daylight when we got to bed and none of us were in shape to go to work that morning. The first thing I did when I got up was to make a bee line for the town pump, which

stood in an alley near the shop, as my throat felt as if it was on fire. On the way I met "Jim" O'Donnell, on the same errand, and when we got there the other three fellows were perched on the horse trough, alongside the pump. We had two or three bumpers apiece and then concluded to go over to Tom Kelley's saloon and play a game of "Pedro." Just as we stepped out of the alley one of the fellows saw Makie coming down the street. We all stepped back again to wait until he had turned the corner, but not before he saw us. As soon as he got to the shop he sent the office boy up to the saloon, to tell us that if we did not show up for work at noon he would discharge us. When the boy came up with his message we told him to tell Makie to have our money ready for us, as we would be down for it in the morning, and went on with our game. That night "Jack" hunted us up and said that we had better show up in the morning, as there were four or five men hanging around without cards and Makie wanted him to fire us and put these men on. As this would be playing into his hand we all showed up for work next morning and nothing more was said about firing us.

One Sunday, before I had drawn any money, I went out to the park with one of the boys to put in the afternoon. It happened that we met a couple of girls whom he knew and he made me acquainted with them. There were a number of swings scattered around the grounds, and the girl who was assigned to me was bent upon having a swing. I didn't know whether the swings were free or not, and not having a cent in my pocket to pay for one, I didn't feel very much inclined to accede to her wishes, making the excuse that swinging always made me sick. Nothing daunted, she called a boy who was attending the swing and asked him to swing her. I couldn't say anything, although I felt very uncomfortable, so I let her go ahead. When the swing was over the boy demanded a dime, and I was forced to confess that I didn't have a cent. The boy started to make a scene and some of the bystanders gave me the laugh, including the girl. I tried to pacify the boy by promising that I would pay him the following Sunday, but this only served to make matters worse and I was finally forced to leave the park. I went back the following Sunday and squared matters with the boy, but it is safe to say that I gave that girl a wide berth after that.

My side partner in the shop was a young fellow by the name of Ed Marsell, who had learned the trade in a little town in Tennessee, and this was the first place he had worked since finishing his time. He was always talking of going on the road and was ready to quit and go anywhere with me at the drop of the hat. I was thoroughly tired of the shop by the end of two months and was ready to quit at a moment's notice myself, but the knowledge that Ed would quit the moment I did kept me there a few weeks longer than I would have stayed otherwise. One morning I overslept and was too late for work. I wasn't feeling in the best of humor over it, so I concluded that instead of going to work after dinner I would go down and get my time. "Jack" gave me my time without saying very much, as he knew that I was "sore" on the job, but when I went into the office to get my money Makie expressed himself very much surprised that a man should quit a good job without a cause. I got my money, though, without any trouble. When I went into the shop to tell "Jack" that I was going to quit Marsell was out in the yard, so that he did not see me, but one of the boys told him that I had quit. As I could not leave town until next morning, as soon as I got my money I thought I would go over and see "Billy" Aldrich before I left. I had hardly been in the shop ten minutes when in rushed Ed, all out of breath. "Have you struck a job?" were the first words he said. I shook my head. "Good," said he, "I quit to go on the road with you and rushed over to tell Aldrich not to give you a job." I laughed at his impetuosity and told him he had better go back and go to work, as it was not such a picnic on the road as he imagined, but I did not urge him very much, as, to tell the truth, I wanted company and would rather have him than an old rounder. I had thought of going to "K. C.," but the "kid" didn't want to get too far away from home, so, in deference to his wishes, I concluded to strike for Memphis. Neither of us felt like going to bed, as we would have to get

up at four o'clock to catch the train, so we spent the night in skylarking around and at five o'clock in the morning we took the train for Memphis.

(To be Continued.)

*Paying for Work by the Piece.

A Differential System Introduced by Mr. F. W. Taylor at the Midvale Steel Works, Philadelphia.

The system of managing men of which this paper treats consists of three principal elements: First, elementary rate fixing; second, the differential rate system of piece work; and third, what may be called the individual system of managing men. By far the most important of these elements is the elementary rate fixing.

The ordinary rate fixing as it is done to-day resembles in many ways the engineering of 50 years ago. The successful engineers of that day were men having a fine sense of proportions, .i e., they were men whose eye and judgment were trained to carrying the proper proportions of machines in their minds, and having once seen a successful machine working they could design frequently another similar machine, preserving, approximately at least, the proper proportions of shafts, gearing, bearings and strength of the frames, etc.

The engineer of that day knew little or nothing of the strength of materials and the elements of design as they are now understood. The science being then largely one successful of imitation rather than analytical study; and the result was frequently that machines were designed and built over three or four times before finally a really successful machine was obtained.

One of the prominent engineers of that time told me that he never considered that a machine was properly made until it had been in the scrap heap once or twice.

Now the rate fixing of to-day, even the best of it, is really in a worse position, relatively, than the engineering of 50 years ago, because the engineers of that time were the brightest men in the profession, whereas the rate fixer of to-day is, generally speaking, to say the least, a poorly educated man and one who has not had the same opportunities as the modern engineer.

Modern rate fixing consists, as it is usually practiced, in recording the actual time spent in doing the various pieces of work which are performed throughout the establishment. These various jobs are then, in the best establishments, classified and recorded in a systematic manner and thoroughly indexed, so that when a new piece of work is to be done a job as nearly as possible similar to it can be picked out from these records and a fair guess can be made at the time required to do the new piece of work.

In nine cases out of ten, however, the rate fixer and recorder has no accurate knowledge whatever as to whether the man who did the piece of work was working at his full rate of speed, or whether he was working at one-half or even one-quarter speed, nor does he know whether the man who did the work was especially expert at his job, or whether he was comparatively unskilled.

The best of modern rate fixers would ridicule the idea that a piece of work could be analyzed into its elements, as readily as a machine could be resolved into its elementary parts, and that the time required to do each of these elementary operations can be accurately determined once for all and then properly classified and indexed in such a manner that they can be referred to far more easily than the whole jobs of work, which are built up from these elements. And yet all jobs of work consist of a series of elementary operations, which are comparatively few in number, and which, when they have once been carefully timed, can readily be remembered by a rate fixer, so that in most cases he is not even obliged to refer to his records in order to ascertain the proper time for each elment.

A few years ago at the end of a piece work struggle with my men which almost amounted to a fight (to be sure, an amicable fight, but nevertheless a severe struggle which had lasted for several years) it dawned upon me that it was far simpler to time the various elementary operations which repeat themselves over and over and over again than it was to study the time for the whole jobs of work.

I therefore decided to study this method of fixing rates, and after practicing it my-

*Abstracted and condensed from a paper read at the June Meeting of the American Society of Mechanical Engineers

self as well as I could with my other duties as foreman for over a year, it proved to be such a success that we decided to establish a regular rate fixing department based on this principle.

It took a long time to collect the data necessary to fix rates in this way, but although it was slow in starting the information accumulated, proportionately, much more rapidly after a good start had been once made.

Much time was wasted at first owing to our adopting the wrong methods of making and tabulating the observations, but in spite of this the department paid for itself almost from the start, and from my observation I could see that in most engineering establishments a trained rate fixer of equal experience and ability with an ordinarily good draftsman could save 10 times as much money for his firm as could be saved by the former. This rate fixing department has proved a thorough success in every way and has established the rates in these steel works for the past two years.

The workmen under a well managed elementary rate fixer soon come to recognize that the rate fixer's knowledge as to the time required to do work is more accurate than their own and when they find that no attention is paid to the actual time which they take in doing the work they rarely dispute his word as to the proper time required to do the work.

What I most earnestly desire is that the rate fixing department shall command equal dignity and respect with the engineering and piece departments of engineering and manufacturing establishments in the future.

It is most desirable that there should be carefully prepared hand-books giving the proper speed at which all of the elementary operations should be done which are common to many of our large manufacturing establishments. I mean hand-books similar to the engineering hand-books which have been prepared for all branches of the profession.

While elementary rate fixing is the most important of the three elements of which the paper treats, it is one thing to know how fast work can be done and an entirely different matter to get men to work at their maximum rate of speed or to come anywhere near it.

The greatest obstacle in the way of doing this in the past has ben the ordinary system of piece work. Under this system it has been distinctly for the advantage of every workman to "soldier," i. e., to hold back on his work and do it as slowly as he possibly could and still persuade his employer that he is working well.

I think this fact must be recognized by every foreman who comes close enough to the men who are working on piece work, and I do not think the workmen can be in the least blamed for doing exactly this thing.

After a workman on piece work has once had the experience of working extra hard turning out an unusually large day's work and then finding himself rewarded the next day by a cut in the piece work price which forces him to work harder than ever and for the same old wages. When he has several times been rewarded for extra hard work by a cut of this sort it is no wonder that he uses every possible means in the future to avoid a recurrence of this treatment, and yet that is exactly what takes place under the ordinary system of piece work.

This system necessarily makes hypocrites and eye-servants out of even the very best men. In fact, its demoralizing effect upon the men is so serious that I question whether well managed day work it not better on the whole for both the men and the management.

Now this soldiering and hanging back on work in piece work establishments extends also to all work done by the day. Since it is even more necessary for the permanent interest of the men that the first record which is obtained by the rate fixer and on which he bases future piece work prices should be on as liberal a scale as possible for the men. It becomes therefore in piece work establishments for each man's interest, even when working by the day, to do just as little work as he possibly can and still retain his position.

Now the differential rate system of piece work was invented in order to harmonize the interests of the workmen and their employers, so that it might be possible for each man throughout the place to work at his maximum rate of speed and still feel sure that in the long run it will be for his permanent interest to do so.

All through my fight with the men under

the old piece work system I found it impossible to go to a workman and tell him honestly that I regarded it for his interest to turn out the maximum possible amount of work which he could do in a day. I was obliged over and over again to force men into turning out more work than they were doing, but I was never able to tell them that I thought it for their interests to do so.

Now there surely must be something radically wrong in any system which obliges its workmen on the one hand to continually play the part of hypocrites in order to maintain their own interests, and which on the other hand forces even a good manager to continually bully or drive men to do things which he knows to be directly opposed to their interests. Such a system as this becomes excessively distasteful and disheartening to a man who really has a regard for the workmen over whom he is placed.

As I have said before, after worrying over this problem for several years and finding my temper growing worse and the men becoming more stubborn, I hit upon the differential rate as the proper means of harmonizing the interests of the two.

The differential rate system of piece work is based upon three principal elements: First, the workmen in almost all trades can and will turn out a very much larger amount of work per day, providing that they feel sure of obtaining permanently a higher rate of pay than they now have; second, employers can well afford to pay higher wages, per piece even, permanently, providing they are sure that each man and machine in their shops will turn out the maximum possible day's work.

This is due to the fact that the indirect expenses of most establishments are as great, if not greater, than the direct expenses, i. e., the taxes, insurance, depreciation, salaries, sales and traveling expenses, the cost of power, light and heat, when summed up, amount in most cases to a larger item than the wages which are paid directly to the men, and these expenses are generally an approximately fixed charge in every establishment which remains the same whether a large or small amount of work is being turned out from the machines.

It must be evident then that whenever a man or machine doubles his output he halves the general expenses which must be charged on to his work, and this diminution of the general expenses in most cases is far greater than the increase in wages which must be paid to workmen in order to induce them to work at their maximum speed.

The third fact upon which the successful application of the differential rate rests is that no workman can be made to do an extraordinary day's work for the usual day's pay, and any manager who flatters himself that he will drive or coax his men into doing an extraordinary day's work for an ordinary day's pay will surely find himself mistaken in the long run.

The differential rate system of piece work consists in paying a higher price per piece when a workman is working at his maximum possible speed than is paid when he is working at a slower rate of speed.

Under the differential rate system instead of cutting a man's wages down for working extra hard, he is given an extra high price for every piece the moment he equals a certain maximum speed in his work. To illustrate: If a man on a turning lathe can produce as his maximum work 10 pieces per day, under the differential rate he would be paid 35c. a piece. When the same man, however, only produces 9 or 9½ pieces per day his piece work price would then be reduced to 25c. per piece.

It is very evident that under this system there is no possible incentive for the workman to hold back or soldier on his work, on the contrary, the least laziness or soldiering on his part is punished in a way which at the first glance seems unnecessarily severe and unjust.

The differential rate system of piece work was first introduced by the writer in the machine shop of the Midvale Steel Co. in 1884. There was some difficulty in persuading the men that the management were really in earnest in their intention of paying them higher wages than were ordinarily earned, but when the men realized that they were to be allowed to earn, permanently, more wages than they had ever earned before they became even more enthusiastic over the system than the management.

This piece work plan was soon adopted by the other departments of the steel works and has operated there most satisfactorily through a period of 10 years. There has

never been a strike with this system of piece work.

The system of day work management of which the writer approves has been practiced, I believe, in several of the best establishments in the country. It consists essentially in regarding the employees of the establishment as men worthy of respect and kind treatment, instead of looking upon them as little better, if as good, as the machines.

In too many establishments the men are herded together and treated as though they were animals of some sort, no distinction whatever being made between the best and the worst workmen who are employed. The only distinction which is made among the men being as to whether they are good enough to remain in the place or are so bad that they must be discharged. All of the men employed in any one class are treated exactly alike whether they are good, bad or indifferent.

Now this herding men together into classes and treating them like animals necessarily leads them to their only possible means of defense, viz., into combinations of some sort which frequently must be against the interest of their employers in order to protect themselves, the mutual result of which is in many cases a series of strikes and open hostilities between them and their employers.

The effect on the character of the men also of herding them together in this way is most disastrous. They almost universally fall below the level of the medium even.

Now the individual system of managing men, which I believe in, consists in studying the good and bad points of each workman and continually readjusting and altering their rate of wages as each man either advances or retrogrades. It consists in treating them as individuals instead of herding them together into classes, and certainly in all cases amply repays the manager for his work and the company for the small extra amount of clerical work required to carry out this system.

I am a great believer in the humanity and the essential kind-heartedness of ordinary day laborers. They do not respond quickly to kind treatment and they sometimes have very strange ways of showing their appreciation. But I know of no set of men upon whom the effect of kind treatment in the long run is more marked than ordinary day laborers.

By kind treatment I do not mean any sentimental kindness, but I refer to the system of management which regards them as men and recognizes their human side.

I have no kind of use for the system of management which drives men to work by damning them and by continual harsh treatment. I fully appreciate that an occasional damn is not only a very useful thing in waking men up in case of an emergency, but that it is also highly appreciated by the men themselves, providing it is only done in a human way and providing they feel at the same time that the man who is driving them has at heart a kindly interest in them.

Men should be talked to on their own level by those who are over them. They should not be treated with condescension, as they are quite as ready to recognize and resent the fact that they are being patronized as any other class in the community.

I remember reading some years ago an article regarding the celebrated manager of the Jardin des Plantes in Paris, which, it seems to me, in a very interesting way illustrates the desirability of talking to men. M. ——, who was one of the most noted masters of wild animals of his day, found that the rhinoceroses in the Jardin des Plantes were becoming savage and unmanageable. He naturally attributed the trouble to their keeper and put a detective on to watch him. The detective, however, reported after close observation that this keeper was the most attentive man in his employ, that the animals were well fed and kept clean, that no one was ever allowed to tease them and that he was in every way a most exemplary keeper. M. —— finally decided to investigate the matter himself, and after spending three or four days in the rhinoceros house he summarily discharged the keeper merely because he never spoke to his animals.

M. —— attributed almost his entire success with wild animals to the fact that he never passed them by without speaking to them. He did not always speak to them with articulate sounds, but he had something to say to every animal that he passed.

It is told of him that even the snakes

would come to the edge of their cage and showed an interest in him because he had a peculiar way of whistling to them whenever he came by.

Now if it is true that wild animals should be continually spoken to by their managers in order to properly develop them, how much more is this necessary with workmen. I do not think that this fact is properly appreciated by most managers and I am quite sure that in 9 cases out of 10 strikes could be avoided if managers would only listen patiently to their men and discuss with each man who wishes to talk it over any grievance which may arise, and from time to time readjust the system of management to agree with what is right and just.

In conclusion we would call attention to the following advantages of the system of management described in this paper:

First. That the manufactures are produced cheaper under it, while at the same time the workmen earn higher wages than are usually paid.

Second. Since the rate fixing is done from accurate knowledge instead of more or less by guess-work, the motive for holding back on work or "soldiering" and endeavoring to deceive the employers as to the time required to do work, is entirely removed and with it the greatest cause for hard feelings and war between the management and men.

Third. Since the basis from which piece work, as well as day rates, are fixed is that of exact observation, instead of being founded upon accident or deception, as is too frequently the case under ordinary systems, the men are treated with greater uniformity and justice, and respond by doing more and better work.

Fourth. It is for the common interest of both the management and the men to co-operate in every way, so as to turn out each day the maximum quantity and best quality of work.

Fifth. The system is rapid, while other systems are slow, in attaining the maximum productivity of each machine and man; and when this maximum is once reached, it is automatically maintained by the differential rate.

Sixth. It automatically selects and attracts the best men for each class of work, and it develops many first-class men who would otherwise remain slow or inaccurate, while at the same time it discourages and sifts out men who are incurably lazy or inferior.

Finally. One of the chief advantages derived from the above effects of the system is that it promotes a most friendly feeling between the men and their employers, and so renders labor unions and strikes unnecessary.

There has never been a strike under the differential rate of piece work and this is in spite of the fact that during the past 10 years the steel business has a record of perhaps more strikes than any other business in the country.

Under the differential rate system, however, and with the individual system of managing men the best men throughout the steel works could never be persuaded that it was for their interests to join a labor union, although the labor unions were allowed to organize the men in the Midvale Steel Works, and although they made every effort to induce those to strike who were persuaded by them to join the unions.

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Put-in-Bay. The palatial equipment makes traveling on these steamers thoroughly enjoyable. Send for illustrated descriptive pamphlet. Address A. A. Schantz, G. P. A., D. & C., Detroit, Mich. "Mention The Foundry."

A Vast Concern.

The Tennessee Coal, Iron & Railway Co is a vast corporation, as almost everyone knows, doing business in the iron producing portions of Tennessee and Alabama.

Recently some strictures have been made concerning its management and methods of doing business by or in the New York Herald. As an evidence of how money can be made or lost by those who speculate or invest in the stocks of large companies, a few facts in this connection might be pointed out.

In December of that year the stock was quoted at 118 and later at 37½, owing, it is said, to some manipulations on the part of those on the inside.

A number of deals were made between that date and this spring in the way of buying new properties, issuing more stock, bonds, etc., and no dividends have been recently paid. So much has been said unfavorable to the company.

This criticism was replied to by some of the company's officers, who said in substance:

"This company does not own a lot of antiquated furnaces and depreciated plants, but it does own seventeen blast furnaces of the newest and most modern make, equal to the best in the world, of which 11 are in blast, making a monthly output of 53,000 to 55,000 tons of iron.

It has made, and is making to-day, iron at a lower cost than has been duplicated in this or any other country, either now or at any previous period. Its plants are in excellent conditiodn, those in blast and those out of blast. It is preparing at present to blow in two additional furnaces, and within 60 days its productive capacity will be 65,000 tons of iron per month. This company is the largest producer of pig iron for the general market in the world. Its coal output varies from 275,000 to 315,000 tons per month; that not consumed in its own operations is sold on the market, and the business is profitable.

It has met its obligations of every character during the severest periods of the panic without asking favors and without disappointing anyone. It did suspend in July, 1893, its preferred stock dividend, for though it had earned it, it was in view of the extreme stringency of the money market considered that it would be conservative to do so temporarily. Every other obligation of every character was met at maturity without any exception whatever. It is to-day earning its fixed charges and earning the dividend on the preferred stock, and will undoubtedly at an early date resume its payment, and with a continuation of the present iron market, on which, for the foundry and forge grades of iron made by this company, it is yet barely to the lowest prices known before 1893, it will earn and pay dividends on its common stock.

It does own a vast area of property, and, as suggested, much more than it has any present need for; it does own more coal and more iron than it would work out if it made 1,000,000 tons of iron a year in 250 years, but those interested in it and owning the property do not feel that the company is poorer by reason of its ownership of this immense area of valuable property, which is constantly increasing in value. It is believed by those who are familiar with the prperty and competent to express opinions that the coal and iron properties owned by this company are superior to those owned by any other concern in the world.

The company owns to-day 80 miles of railroad, 30 locomotives and 500 cars. This company had on its furnace yards on May 1 last 103,000 tons of pig iron; this pig iron has been sold.

This company will make with 13 furnaces in blast 65,000 tons of iron per month, and at present market prices its profits will be $2.50 to $3 per ton. Its profits on its coal business will not be less than $1,000 per day.

Robt. E. Seitz has been appointed foreman o fthe foundry of the Pennsylvania Agricultural Works, Yorw, Pa.

W. R. Warner, formerly with Rogers, Brown & Co., but now with Matthew Addy & Co., will look after the territory between Chicago and Louisville, inclusive, for the latter house.

Philadelphia and Vicinity.

Philadelphia, August 10, 1895.

The golden anniversary of the Foundrymens' Association was held on the 7th, and though the weather was warm there were present a majority of the leading members. An important matter for their future consideration was presented and acted upon.

They propose holding a convention early in October for the purpose of forming a "National Association of Foundrymen." A committee was appointed, of which Walter Wood is chairman; Thomas Devlin, W. H. Pfahler, Thomas Glover, J. Sellers Bancroft, Francis Schumann, president of the association, and Howard Evans, secretary.

Aside from the sociability and the interesting topics discussed by this successful organization, we are pleased to report hearing a great number of the foundrymen congratulating each other upon running six heats a week, and the number of estimates for future work.

The business outlook here is one of slow but sure improvement, and with two foundries having restored 10 per cent of their employes' wages we hope to report greater improvement in our next. MAURICE.

Chicago and Vicinity.

Foundries in Chicago and vicinity show an improvement, while but few are rushed many are busy, and all have something to do. The outlook is brighter than for some time and the prospect for fall trade is good.

The Chicago Hardware Mfg. Co. will move their plant to Waukegan.

Wells & French Co. are building a new foundry, 200x120 feet. It will be ready for business September 1.

Siemans & Halske severed their connection with the Wells & French Co. and have bought the Grant Locomotive Works.

Deering Harvesting Machine Co., on July 26 fire broke out in a stock of hemp which was being prepared for binding twine. Loss on stock, $15,000 to $20,000. Loss on building, $500.

Illinois Central Railway will close their foundry the first of the year.

A. Bolter & Son received contract from the National Machine Works for 500 tons gas fittings.

Gates Iron Works are putting in a new cupola.

Mr. John Ramsey, of the firm of Tarrant & Ramsey, has just returned from a pleasure trip in canada. H. S. V.

New Corporations.

The Phoenix Foundry Co. at Oakland, Cal., has an incorporated capital of $100,000.

The Star City Machine & Foundry Co. is a new concern at Lafayette, Ind., incorporated with $25,000 capital.

The Michigan Vapour Stone Co., Grand Rapids, Mich., has incorporated with $50,000 capital.

The Lake Superior Foundry Co. has incorporated at Little Falls, N. Y.; capital, $20,000. They will make furnaces and hot water heaters.

New Foundry Enterprises.

W. Bowes is building a large foundry at Sussex, N. B.

Kelly & Taneyhill are building a foundry at Waterloo, Ia.

The W. E. Hill Co. will build a foundry at Kalamazoo, Mich.

George Bensarkt will build a foundry at Kansas City, Ks.

J. H. Newbury will build a foundry at Voorheesville, N. Y.

Roberts & Son's foundry building at Delta, Pa., has been completed.

The Ranton Boiler Co. will construct a large foundry at Syracuse, N. Y.

The Shuster Foundry & Soil Pipe Works, at South Pittsburg, Tenn., are enlarging.

The Flemington Iron Foundry at Flemington, N. J., are doubling the size of their plant.

The Star City Foundry & Machine Co. is a newly organized stock company at Lafayette, Ind.

The Baltimore Malleable Iron & Steel Co., at Baltimore, Ind., will enlarge their works by the addition of a molding room 50x210 feet.

The Ayer Foundry Co. at Ayer, Mass., after being shut down for many years, has been re-opened under the management of Henry McGreggor.

The old Green Island foundry at Green Island, Troy, N. Y., will be re-opened. It was established by M. L. Filley in 1835, but has been idle for several years.

Questions and Answers.

A reader in the March issue of The Foundry, asks for information concerning the possibility of making locomotive cylinders, without a dry sand oven, and skin-drying them.

It is both possible and practical to use the skin-drying method to make these castings, and will give as near as possible some useful hints on such practice.

To skin-dry a mold for heavy work, such as locomotive cylinders, requires that several conditions be carefully observed: First, a sand for facing, or I should say a mixture must be made that will be open and strong; two-thirds molding sand and one-third coarse sharp sand, wet down with molasses water, will generally make a good mixture unless the molding sand is very fine, in which case more coarse sand or very fine gravel should be used.

If the mixture is too close the mold is apt to buckle and also be hard to dry, so great importance is attached to using a sand that is open when dry. Flour has often been used in this connection to make the mold hard and firm, but it has been found by some to be a detriment, in stead of help, it closing the pores of the sand, while molasses water hardens the surface and disappears upon the approach of extreme heat.

The mold for a locomotive cylinder has many sharp corners that are easily burnt, and very liable to get bruised or broken off, in setting the number of complicated cores they contain, when made by the sikn-drying process. To avoid this little aggravation, wet such corners with linseed oil before applying the blacking and when dried they will be hard as a stone. Another essential item is always use a good bed of coke under the casting, and vent to it thoroughly, leaving its outside vent connections open during drying. Before drawing the pattern, vent around it thoroughly at the parting with a quarter-inch vent wire, and leave the vents open until the mold is dried; this gives the steam an opportunity to escape and assists rapid drying, also preventing the cracking or scaling off on the surface of the mold, a not uncommon thing in skin-dryed work, if care is not used. When the steam is confined it often strikes back with disastrous results to the hard scale that is formed on the surface by the first introduction of heat. Otherwise the casting can be rammed up, or bedded in, as the case may be, just the same as a green sand casting; of course, the blacking is applied wet and slicked, and the mold must be given a good, thorough drying, with a basketful of charcoal or coke hung in it.

Another very good plan, and I sometimes think the best under such circumstances, is to make the casting in regular dry sand, and arrange it in the following manner:

Dig the pit about twelve inches larger all around than the pattern, make a coke bed about four inches lower than the pattern, and ram it down solid to suit the shape of the casting, cover with straw and bed your sand and pattern upon that. The sides must then be rammed up as follows:

Cut some pieces of heavy sheet iron about eighteen inches wide, and place them around the pattern, leaving a space of six inches between the sheet iron and the pattern, and a similar space between the sheet iron and the wall of the pit. Then ram up the space next the pattern with the dry sand mixture, and the space next the pit with coke, and keep drawing the sheet iron up as you ram, and when finished pull the sheet iron entirely out. This will give you a wall of dry sand backed up by a wall of coke. Upon the application of heat or fire on the inside of mold, it drives all the steam and moisture back into the coke, from where it passes off through the vent pipes, and when thoroughly dried, the coke wall prevents the mold from absorbing any moisture from the surrounding pit or floor, besides serving the purpose of carrying off the vent.

When made this way it takes some little time longer to dry than with the usual skin-drying method, but is without question the safest way to make the casting. It should have a good basket fire in it for not less than forty-eight hours.

There is much more I could say on this subject, but feel I have taken enough space already; however, if it is in my power to furnish any further information it will be cheerfully rendered at any future time.

H. R.

R. B. T. in the March issue of The Foundry asks some questions in a field but little explored. While confining his questions to

the casting of iron on brass, the difficulties to be overcome resemble one another in all places where it is desired to have two different metals form a permanent union, and a great trouble is sometimes found in simply covering or surrounding one metal with another.

There are two kinds of evils standing in the way of different metals taking a liking to each other, and in many cases these are compounded, making a complicated disease to diagnose. One is the impurities, such as rust and dirt, that lodge upon metals. In simply covering one metal with another it will be found of the greatest help to have all parts to be covered perfectly clean. Some people seem to think that an abundance of oil is all that is needed to make an agreeable introduction for these to each other strange parties, so they put it on thick. This is one of the things done because we have seen others do so. It is not called for, in fact it is a positive hindrance in this line of work and often proves a strong preventive to success.

Just try to convince yourself of this by pouring some kind of fluid metal upon any surface, either metal or sand containing oil, but have it so you can observe the action of the oil upon the fluid metal. You will then find that the heat from the metal converts the oil into gas, and that this in passing off agitates the metal very greatly. There is a continued bubbling until no more gas is generated or until the metal becomes solid, which it does very quickly under this great agitation. When you have tried this experiment once you will discard the use of oil for this purpose and be a gainer in more ways than one.

A clean, bright surface is the most essential part, but the temperature of the solid metal to be joined also affects the operation. but much less than supposed. The reason the value of heating the solid metal has been overestimated is because the heating of it is in itself one of the greatest cleaning processes than can be applied. and the heat has been given the credit for what elbow grease should have done or rather could have done.

Where it is desired to form a permanent union between two metals, we have a still greater obstacle to overcome. We can unite cast iron to cast iron, but let us attempt to join it to steel or brass and we begin to find cause to scratch our heads. The different metals resent more or less, losing their individuality. Each contains different elements in different proportions and to effect a permanent union between them, and let one casting be enabled to answer to different purposes calls for what statesmen call diplomacy.

The mixing together of any two metals of different characteristics is attended with an increase of heat, although an alloy of these is often found to melt at a lower temperature than either. In this action a small part of the metals is consumed or lost passing off in the form of gas. This will take place no matter how clean the metals are if a permanent union is formed. Thus we have two kinds of ailments, one which hard work will remove and one for which we are not responsible.

For the kind of work which R. B. T. describes, some foundries cast the brass onto the iron casting instead of as he says, casting the iron onto the brass casting. If any part of the brass is to be finished it is cast down, necessitating the hanging of the iron casting in the cope.

It is also customary to cast such combinations under a greater head of pressure than ordinary, using hot metal and gates that will admit of fast pouring, care being taken to have the gates in such a position that they will not permit of the fluid metal running against the enclosed casting as it enters the mold and cut it away.

The greatest aid to successful surgery is absolute cleanliness. The same importance attaches to it in any undertaking where metals are to be joined together. H. H.

In answer to W. C. on chilled rolls. I have had considerable experience on chilled rolls for rolling out silver and aluminum. I would advise W. C. to use six three-eighths of an inch sprues for his runner, and to cut his gate all out of his cope, going all round with the exception of about four or five inches, to be used for his riser; to cut one continuous gate, letting it extend inside of his chill about three-sixteenths of an inch, and cut his riser about one-quarter of an inch in the same manner, letting it be a flow off, and to build his runner about three

inches higehr, so that he can flow about thirty or forty pounds of iron through.

B. G.

Notice.

Advertisements Entitled Situations Wanted, or Situations Vacant Will be inserted in this column one insertion FREE. All others 25 cents per line.

FOR SALE—A new and modern facing. See page 37. Send for sample. It will pay you.

WANTED—First-class moulder. Address J., care The Foundry.

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WANTED—Good molder with some little capital to purchase interest in paying foundry business. Address "Indiana," care The Foundry.

FOR SALE OR RENT—Foundry plant in complete running order; buildings and machinery practically new; 1½ acres of ground with switch from railroad. Address E. F. Russell, 1155 S. Paulina st., Chicago, Ill.

WANTED—Situation as foreman in machinery or jobbing shop. Am accustomed to loam dry sand and green sand molding and use of molding machines. Have been five and one-half years in present situation as foreman and seven years in England. Address J. L., care The Foundry.

WANTED—The foremanship of an iron foundry by a foreman of energy and ability; experienced in handling men, mixing and melting iron, in loam, dry and green sand, heavy or light work; a pusher; where up-to-date foundry practice and sobriety will be acceptable; good references. Address R. H. P., care The Foundry.

WANTED—Foundry foreman able to produce light and medium weight castings economically. Familiar with latest methods of gating patterns for quick production. Foundry near New York city; employs 50 molders. Address, giving past experience, wages expected, age, etc., New York, care The Foundry.

FOR SALE, at a very great loss to close up an estate.—In order to close up the estate of Mr. Huntington Beard, we offer for sale a first-class foundry and machine shop plant, consisting of a machine shop 30x60(three stories high, with a complete set of iron and wood-working tools and machinery; foundry 60x80 feet, with first-class equipment; fire-proof pattern building, 30x30 feet, three stories high, containing a very large stock of most desirable patterns; also blacksmith shop, store house, japaning building and office building; both steam and water power; located on the West Shore Railroad and Erie Canal, eight miles from Syracuse, N. Y. This is just the plant for manufacturing hardware specialties, and it can be bought for about one-quarter of its cost. For further information address The Estate of Huntington Beard, Fayetteville, N. Y.

Among the Foundries.

The Ballard Iron Works, started in 1889 at Ballard, Wash., will be sold and reopened. It only ran a short time.

The Brayton foundry at Providence, R. I., has raised wages 12½ per cent.

The Pennsylvania Bolt & Nut Co., at Lebanon, Pa., are putting in a new cupola.

The E. L. Dent Iron Works at Washington, D. C., has been sold at auction to satisfy creditors.

The Georgian Bay Foundry and Machine Shop at Collingwood, Ont., was destroyed by fire recently.

Thomas Kelly has purchased the interest of Thomas Kennedy in the foundry both have been running at Oneida, N. Y., and hereafter will conduct the business alone.

The Chattanooga Foundry and Pipe Works are working 300 hands on full time, and are laying pipe in Chicago, New Orleans, New York and Vermont.

Sherwin & Niles, though a new concern at Muskegon, Mich., are very busy in their foundry, and expect shortly to engage in the manufacture of gas engines on a large scale.

Hetzel & Co., at Blairsville, Pa., whose foundry was destroyed by fire some time ago, have it now rebuilt. It will be known as the Blairsville Foundry & Machine Co.

Geo. T. Steete has disposed of his foundry in Anamosa, Ia., and will accept a proposition to remove to Cedar Rapids, Ia.

Munson Bros.' new foundry at Utica, N. Y., has been completed and is said to be very complete. It is 75x80 feet, and fitted with all modern appliances, among the latter being a traveling crane from E. Harrington Sons & Co., Philadelphia.

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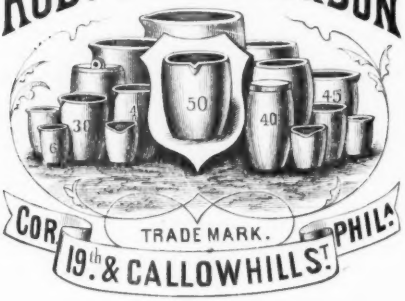
Crucible.

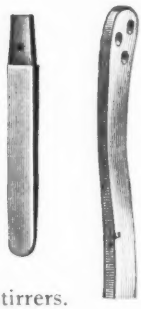
ROBT. J. TAYLOR & SON



Crucible

Dipper.

Jewelers'.


Stirrers.

Cover.

Cover.

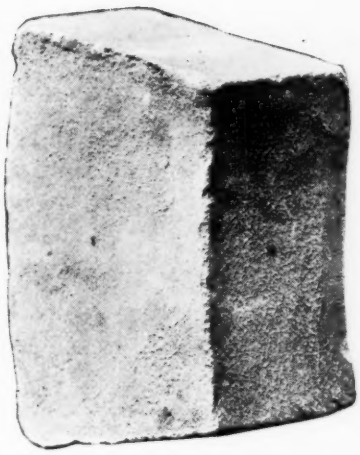
Stopper.

Crucibles

For melting STEEL, BRASS, COPPER, GOLD AND ALL OTHER METALS. We are the only PRACTICAL MEN in our business and we work strictly by CHEMICAL ANALYSIS; our CRUCIBLES will be found UNIFORM and RELIABLE at all times; they are well known all over this country and also Europe; send us a trial order and we will secure you as a customer. Also FINE GRAPHITE for LUBRICATING PURPOSES, for the devolopement of High Speed and Great Power. Our GRAPHITE is the purest in the market as Analysis will prove.

ROBT. J. TAYLOR & SON,

1900 to 1916 CALLOW HILL STREET, PHILADELPHIA, PA.



The Acme Cupola Block

Not any higher in price than other high grade Fire Brick, but much better for Cupola Lining, because they are made to

Stand the Wear and Tear, As well as the Highest Heats.

High grade brick are usually soft and wear away easily, while a hard brick seldom has the required refractory qualities and melts. With the ACME BLOCK we overcome these faults. They neither melt or crumble easily in the cupola.

MOLDING SANDS.

OHIO'S CHOICEST GRADES.

GLENFORD No. 10—For Stove Plate, Hollow Ware, Malleable Iron and Light Castings. No. 4 and 5 for Light Machinery, Soil Pipe, General Jobbing, etc.

SANDUSKY No. 1—Fine open grade for Agricultural and General Castings. No. 2 (The new Sandusky) a strong grade, excellent wearing qualities.

ZANESVILLE No. 2—Fine for light castings. **No. 6 RED**—Famous for heavy machinery and other large castings.

RED HILL—The best of fine brass sands.

Always glad to furnish samples and any information in regard to their use. Send for circular showing who use our sands and what they use them for.

The Ohio Sand and Clay Co.

THE FOUNDRY. COLUMBUS, O.

JAMES COCHRAN.
P. G. COCHRAN.

ESTABLISHED 1843.

J. R. LAUGHNEY, General Manager.

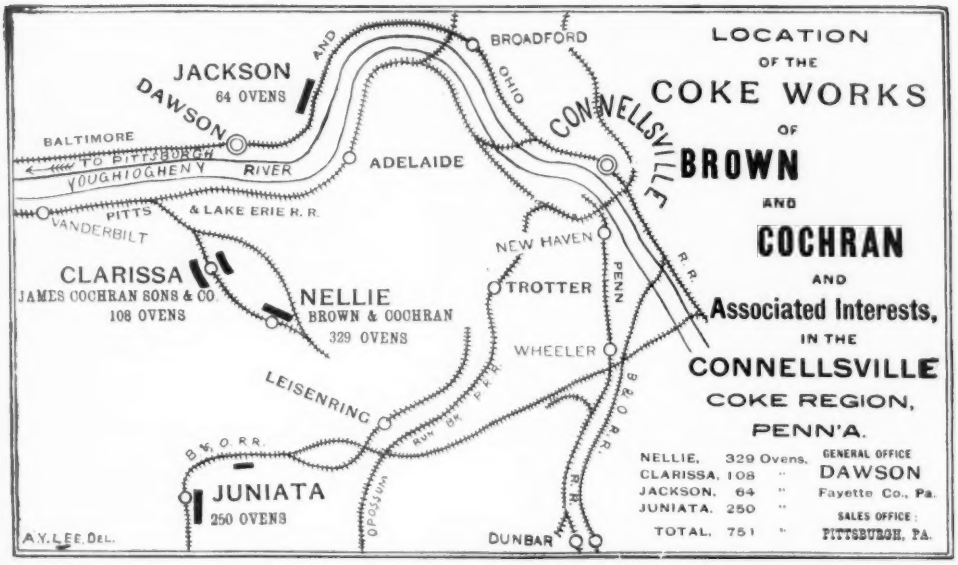
SAM'L S. BROWN.
HARRY BROWN.

BROWN & COCHRAN,

PIONEER MANUFACTURERS,

GENUINE

Connellsville ..Coke..



Note.-Our mines are located near CONNELLSVILLE, the CREAM of the GENUINE Coking Field. Shipments via any route.

N. P. HYNDMAN, Sales Agent,

Room 8, Conestoga Bl'd., 7 Wood St.

Mention THE FOUNDRY.

PITTSBURG, PA.

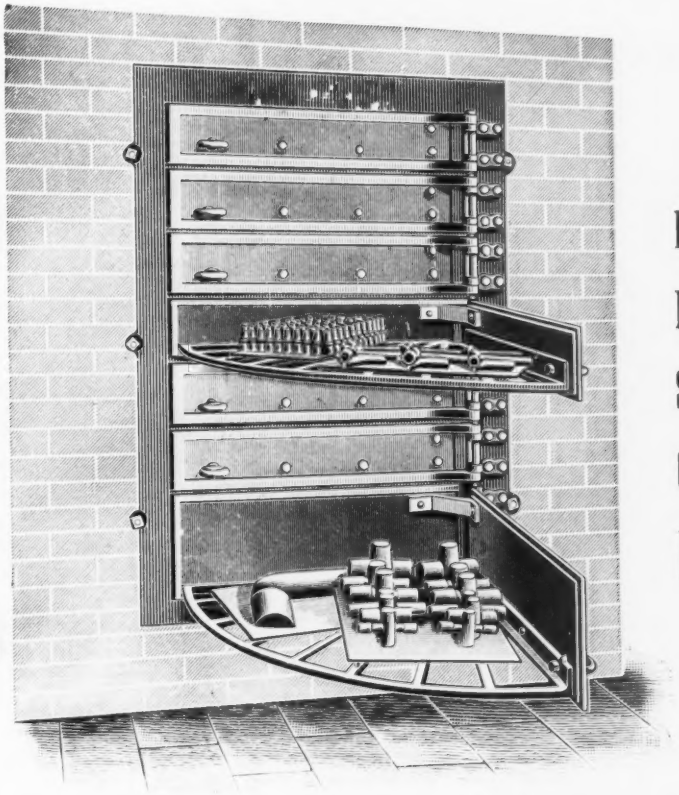
Millett's Patent Core Oven

—With—

Double Doors, one at the back of shelf closing the oven when wide open.

Patented July 19, 1887.

Saves Fuel
Saves Expense
Saves Time
Does more work
Makes Better
CORES.



If you Make Small Cores you Need it

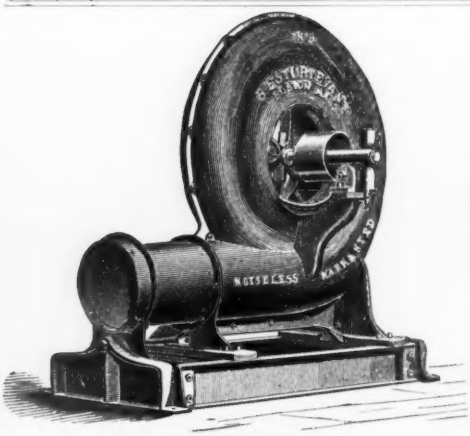
One Hundred in use and every one gives satisfaction.

Write us for circulars and prices.

Millett Core Oven Co.,

Brightwood, Mass.

FOR SALE BY J. W. PAXSON & CO., PHILADELPHIA, PA.



Blower on Adjustable Bed.

THE STURTEVANT STEEL Pressure Blowers,

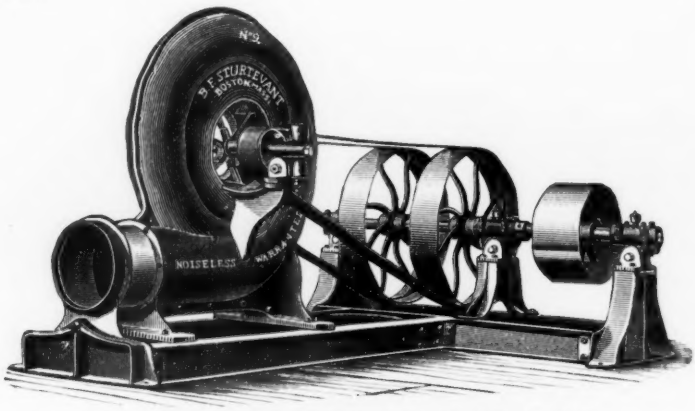
—FOR—

Cupola Furnaces and Forge Fires.

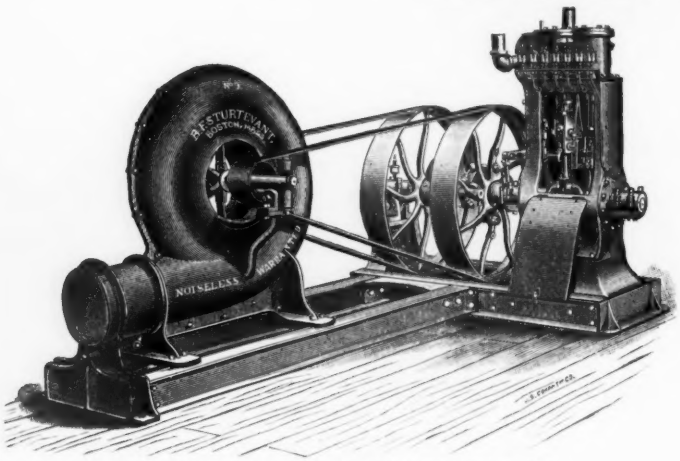
BLOWERS

Furnished without Bed with Separate Countershaft

BLAST GATES



Blower on Adjustable Bed with Combined Countershaft.



Blower on Adjustable Bed with Double Enclosed Engine.

BLOWERS

WITH

THE STURTEVANT

Direct Connected

Electric Motors

Send for Catalogue.

B. F. STURTEVANT CO.,

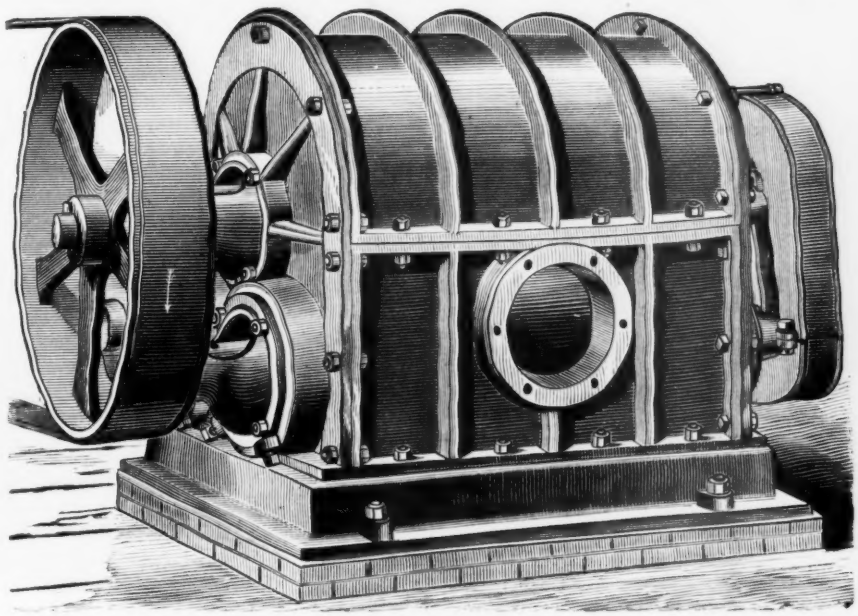
BOSTON, MASS.

91 Liberty Street, NEW YORK. 135 N. Third St. PHILADELPHIA.
16 S. Canal St. CHICAGO. 75 Queen Victoria St. LONDON.

STOCK CARRIED AT BRANCHES.

The Baker Rotary Pressure Blower

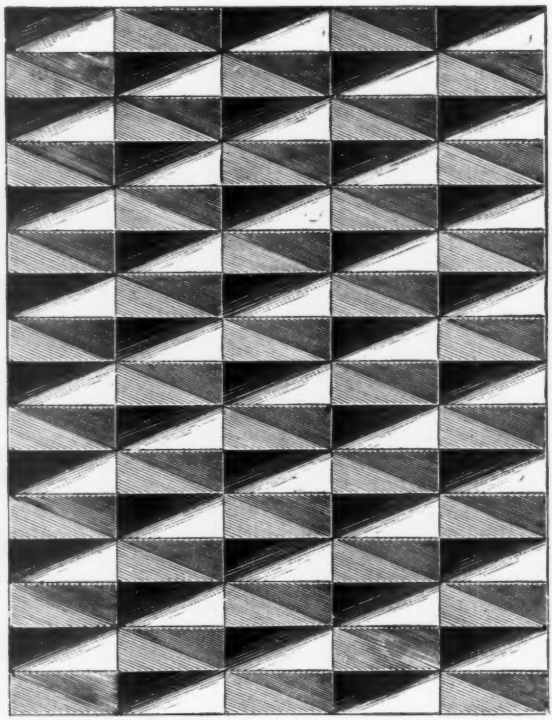
ONLY ONE BELT IS REQUIRED TO DRIVE THE LARGEST BLOWER.

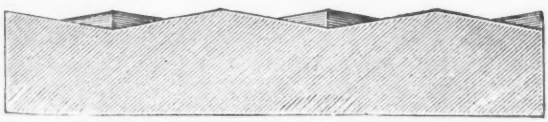


The Best POSITIVE PRESSURE BLOWER for IRON FOUNDRY CUPOLAS, Pneumatic Tubes, Water Gas Works, Smelting Silver, Lead, or Copper Ores, Sand Blast, Forge or Knobling Fires, Ventilating Mines or Tunnels, or any other purpose requiring a POSITIVE BLAST OR EXHAUST.

Wilbraham Baker Blower Co.,

2518 Frankford Ave., PHILADELPHIA, PA.





The above cut shows exact size of Diamonds.

Diamond Pattern Lumber,

—FOR—

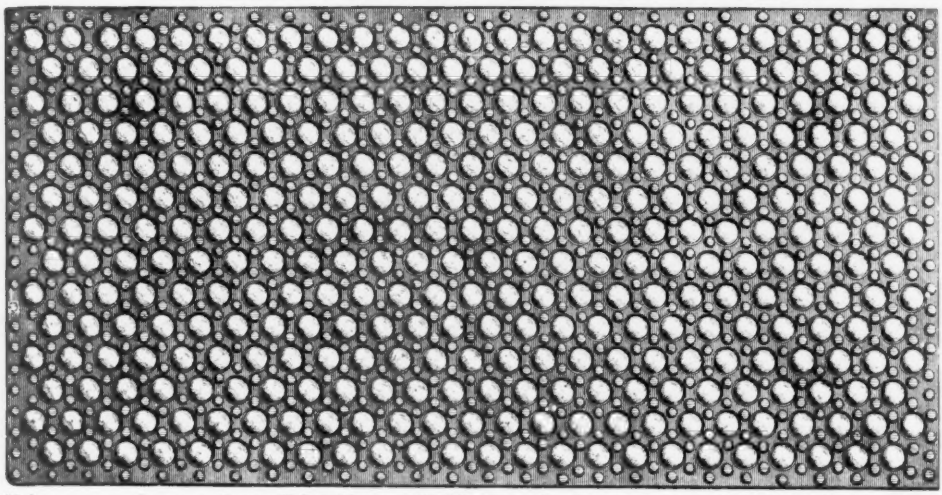
DOOR SILLS, PLATFORMS, STEP PLATES, Etc.

This Patent Lumber is made by a Special Machine invented by us, the ONLY Machine of its kind, and each piece will match PERFECTLY with all other pieces, by "joining" the edges to the centre, lengthwise, or any row of Diamonds. Size of each piece, 8 feet long by 6 inches wide, and ½ inch thick. Price 10 cents per running foot of 6 inches in width, NET CASH crated and delivered f. o. b. Chicago, in orders of not less than 6 pieces. Send for sample.

BROWN BROS. MFG. CO.

Cor. Clinton and Jackson Sts. Chicago.

PRISMATIC SIDEWALK LIGHT TILES.



Make your own frames and we will furnish you with Tiles for either Iron or Concrete Lights. Write for prices.

BROWN BROS. MFG. CO.,

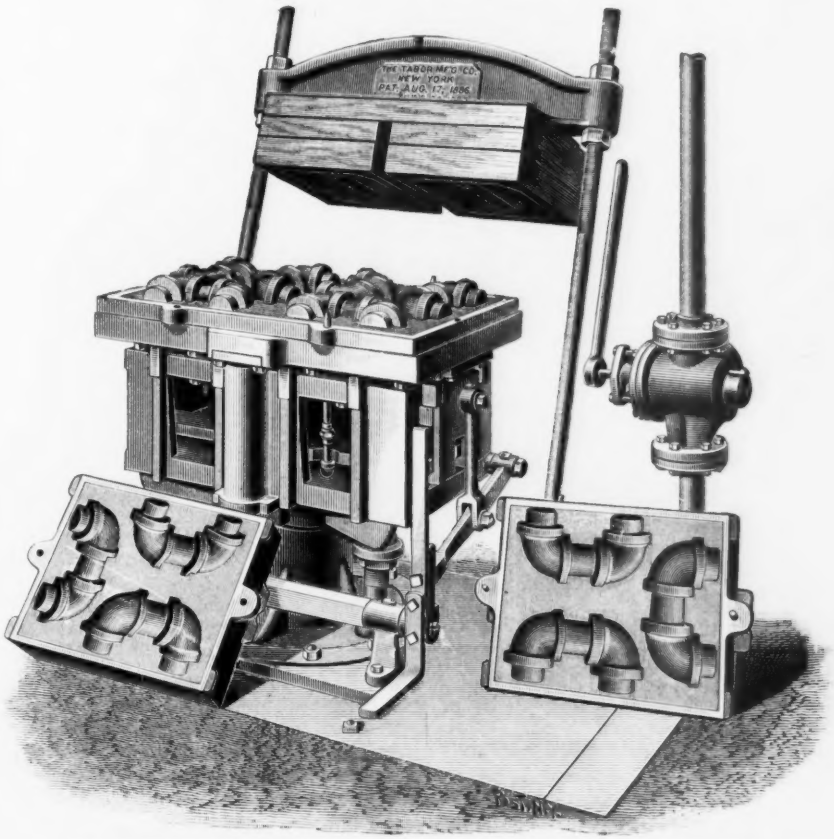
Mention THE FOUNDRY. **Cor. Jackson and Clinton Sts. CHICAGO.**

The Tabor Manufacturing Co.,

—MANUFACTURERS OF—

AUTOMATIC MOLDING MACHINES

For Sand Molds for Metal Castings.



AUTOMATIC DUPLEX MOLDING MACHINE.

Molds both parts of flask at one operation of machine, thus making two machines in one.

These machines are adapted to general castings when made in reasonable quantities.

The use of these machines is a guarantee of economy, greater quantity and better quality in castings.

Foundrymen who are interested in producing cheap castings of superior quality are invited to correspond with the Company and call at the works, Front and Franklin Streets, Elizabeth, N. J., and see the machines in operation.

113 Liberty Street,

NEW YORK, - - - N. Y.

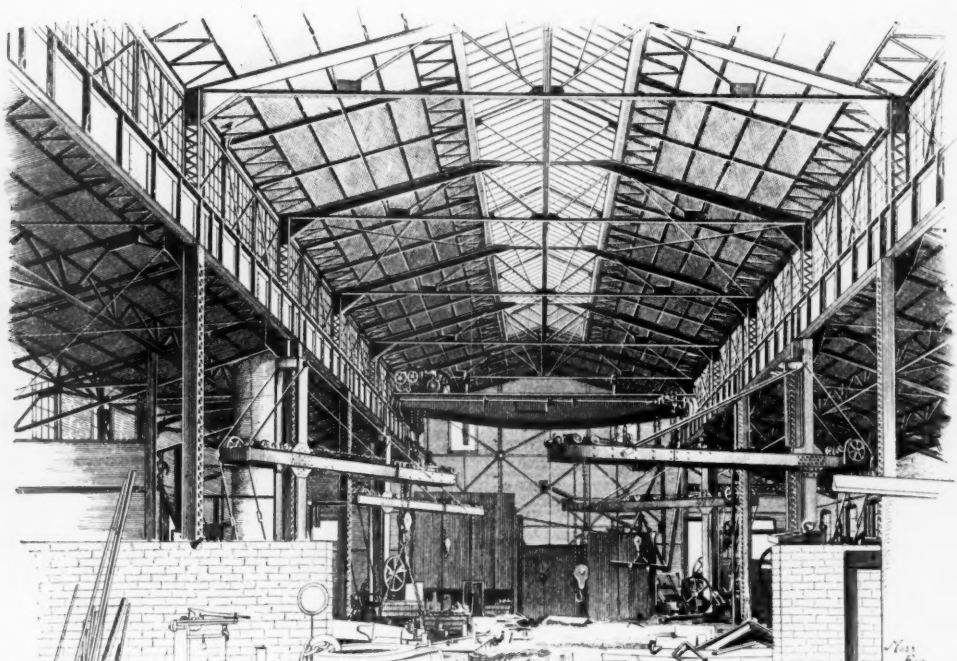
CHAS. M. JARVIS, President and Chief Engineer. BURR K. FIELD, Vice-President.
GEO. H. SAGE, Secretary F. L. WILCOX, Treasurer.

THE BERLIN IRON BRIDGE CO.,

ENGINEERS, ARCHITECTS

—AND BUILDERS OF—

Iron and Steel Bridges, Roofs and Buildings.



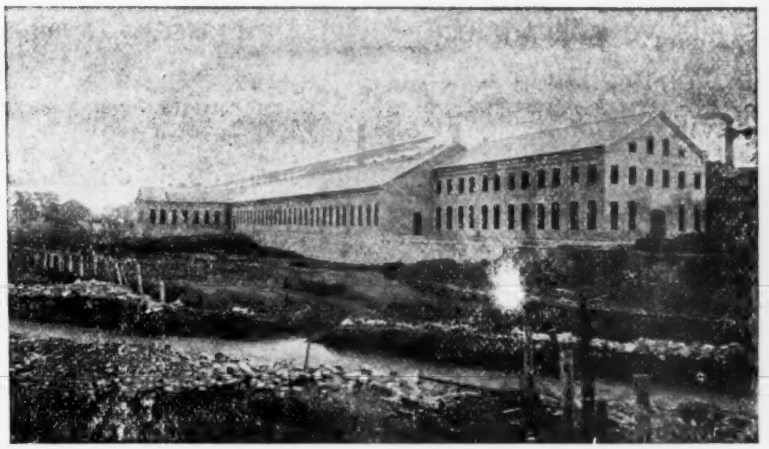
The above illustration is taken direct from a photograph and shows the interior of a foundry building which was designed and built complete by us for S. F. Hodge & Co., at Detroit, Mich. Each wing is 24 feet in width, and the central portion is 40 feet in width, this latter controlled by a crane with a travel the full length of the building. The crane girder posts are designed to carry jib cranes, as shown. The roof is covered with our Patent Anti-Condensation Corrugated Iron. The building is absolutely fire-proof, and the corrugated iron roof is guaranteed not to drip during the coldest weather.

Office and Works, - - EAST BERLIN, CONN.

SEND FOR ILLUSTRATED CATALOGUE.

Wrought Iron Bridge Co.,

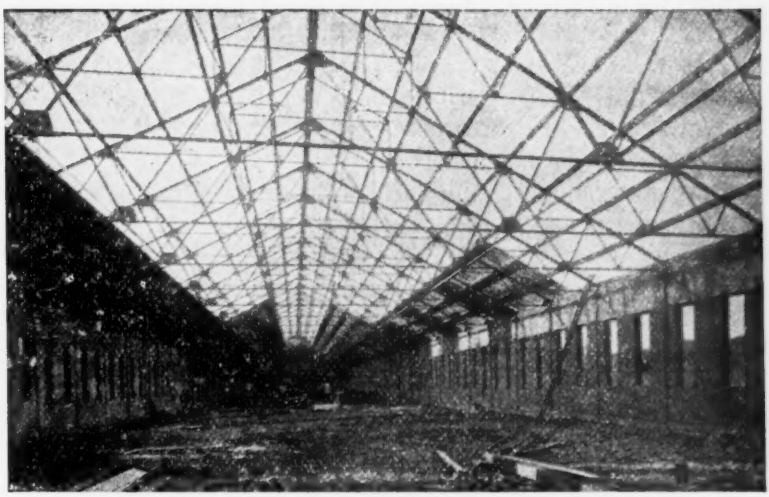
DESIGNERS AND BUILDERS IN
IRON AND STEEL
FIRE PROOF BUILDINGS



— FOR —
FOUNDRIES, MACHINE SHOPS
ETC., ETC.

Exterior of Foundry of Warder, Bushnell & Glessner Co., Springfield, Ohio.

Traveling and Jib Cranes for handling
Heavy Castings and Machinery.



Buildings Designed for Special
Requirements.

Interior Foundry Building of Warder, Bushn & Glessner Co., Springfield, Ohio.

The roof of this building was erected by the Wrought Iron Bridge Co., Canton, Ohio, and consists of steel trusses supporting wooden purlins to which matched and dressed sheeting is nailed for slating. Trusses being 18 ft. above the floor, the wood work of roof is out of danger from fire, while the cover being of slate a suitable cornice to protect the overhanging of roof from flying sparks, or heat from the burning of neighboring buildings, renders this structure absolutely fire proof. Windows are set in the sides of ventilator throughout its entire length, so that ample light and ventilation is insured.

Wrought Iron Bridge Co.

ADDRESS NEAREST OFFICE.

CANTON, O. KANSAS CITY, MO. CHICAGO, ILL.

136 Liberty St., NEW YORK.

JUST NOW we won't say anything OURSELVES about our cranes.

Instead we will produce a few witnesses.

We won't tell you what they say.

We will let our order book show what they have done.

That shows they have not only bought our cranes once, but after using them one, two or three years have bought more of them.

Some have ordered several times.

These are their names and times.

NAME.	ADDRESS.	NO. OF ORDERS.	NO. OF CRANES.	TOTAL LIFTING CAPACITY.
The Edw. P. Allis Co.,	Milwaukee, Wis.	4	6	170 tons
The Pond Machine Tool Co.,	Plainfield, N. J.	2	2	35 "
Samuel L. Moore & Sons Co.,	Elizabeth, N. J.	2	2	30 "
McIntosh, Seymour & Co.,	Auburn, N. Y.	2	3	50 "
Dry Dock Engine Works,	Detroit, Mich.	2	2	40 "
Carbon Steel Co.,	Pittsburg, Pa.	2	5	50 "
Westinghouse Electric & Mfg. Co.,	Pittsburg, Pa.	2	4	80 "
Frank-Kneeland Machine Co.	Pittsburg, Pa.	2	3	65 "
Wm. Bayley & Sons Co.,	Milwaukee, Wis.	2	3	39 "
Midvale Steel Co.,	Philadelphia, Pa.	3	4	180 "
United States Government,		4	5	225 "

IF YOU WANT MORE EVIDENCE WRITE

The Shaw Electric Crane Co.

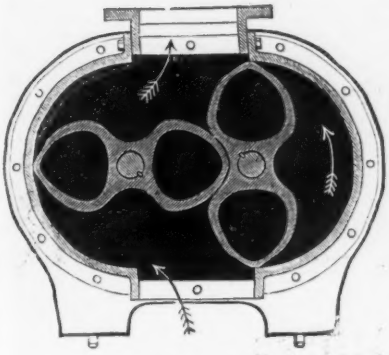
MUSKEGON, MICH.

MANNING, MAXWELL & MOORE,

424 TELEPHONE BUILDING, PITTSBURG.

60 S. CANAL ST., CHICAGO, ILL. 111 LIBERTY ST., NEW YORK.

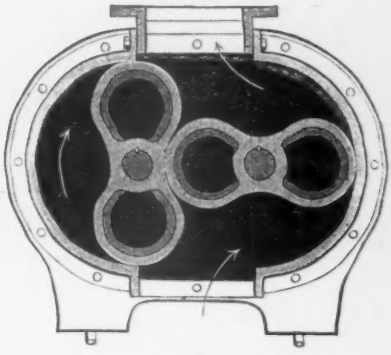
Roots' Positive Pressure Blowers



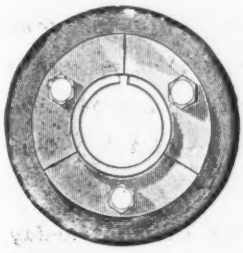
Roots' Standard Blower.
Best adapted to all kinds of smelting purposes, forced draught or suction.

1859

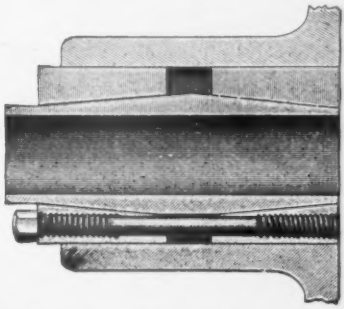
1895



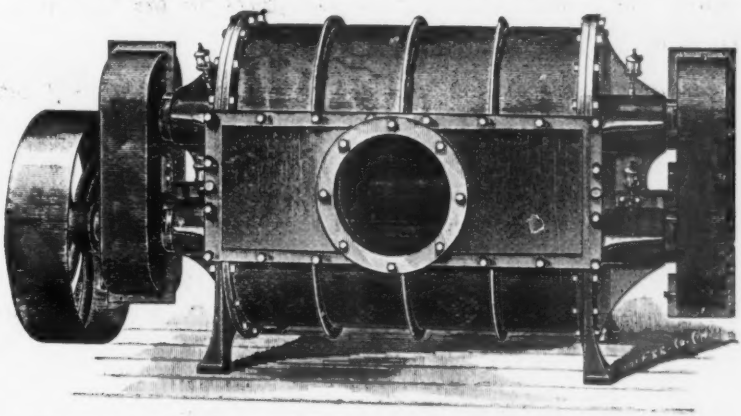
Roots' True Circle Blower.
Best adapted to high pressures, pneumatic tubes, etc.



Mechanical Construction Unequalled. Top, Bottom or Side Discharge.



THE ONLY PERFECT JOURNAL BOX FOR POSITIVE PRESSURE BLOWERS.



P. H. & F. M. Roots Co.,

Connersville, Indiana.

—ESTABLISHED 1859—

ROOTS' POSITIVE
PRESSURE BLOWER

Superior to All Others.

The principles upon which our Blowers are constructed are so different from competing machines that we are enabled to design and construct them in such a manner that, with proper attention, the maximum degree of efficiency can be maintained their entire life-time. We have Blowers in operation to-day which have been running for twenty-five years.

Compared to the Blowers we built twenty-five years ago, those we build to-day are far superior in every respect, so that it is impossible for our present machines to gradually deteriorate, as others do, the longer they are used.

Naturally, the high standard of mechanical excellence to which we have brought our latest improved machine, is the result of our efforts for the last thirty-five years to reach this point.

The only positive pressure blower that can be run at a high speed with perfect safety.

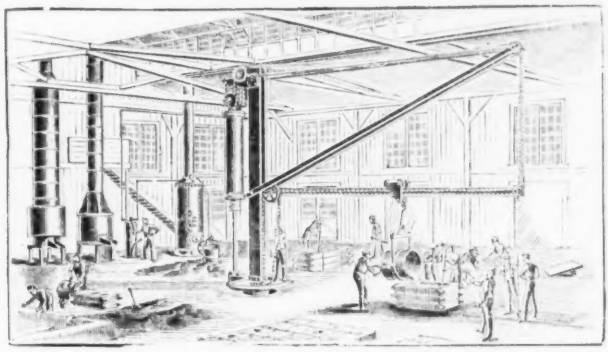
WRITE FOR ILLUSTRATED CATALOGUE.

P. H. & F. M. Roots Co.,

Connersville, Indiana.

COOKE & CO., SELLING AGENTS, 163-165 WASHINGTON STREET, NEW YORK
FRASER & CHALMERS, SPECIAL AGENTS, CHICAGO, ILL.

"Please Name Price on Hand Crane,



STEAM-HYDRAULIC CRANE.

Such and Such Size"

IS A DAILY REQUEST TO US.

Well, We Won't!

DON'T MAKE HAND CRANES

Any superintendent or foreman who advises a Hand Crane about a plant in this year of progress, 1895 (unless out of reach of steam) don't deserve to hold his position.

Any such man who won't kick like a steer if his boss suggests a Hand Crane, ought to be promptly "fired" and an up-to-date man got in his place.

WHY, JUST LOOK—we will supply a Ridgway Steam Hydraulic to any good concern in place of a hand crane, free of charge. Will come and put it up, too, and take for our reward one-half what it saves in wages.

In foundries alone—our customers say—the same moulders do 50 per cent. more work for same wages with this Crane than with any other winding crane. That's why the best foundries are getting them so fast.

Don't buy Cranes until you write us fully. If you only know about this Crane, no man could GIVE you any other sort. When people know about it, the only question is . . . .

"Ridgway, How Soon Can We Get It?"

And when they get one, the next question is **"How Soon Can You Duplicate Our Order?"** If you don't believe it, come and see the letters or go and see the people.

We make elevators, too. Get the circulars.

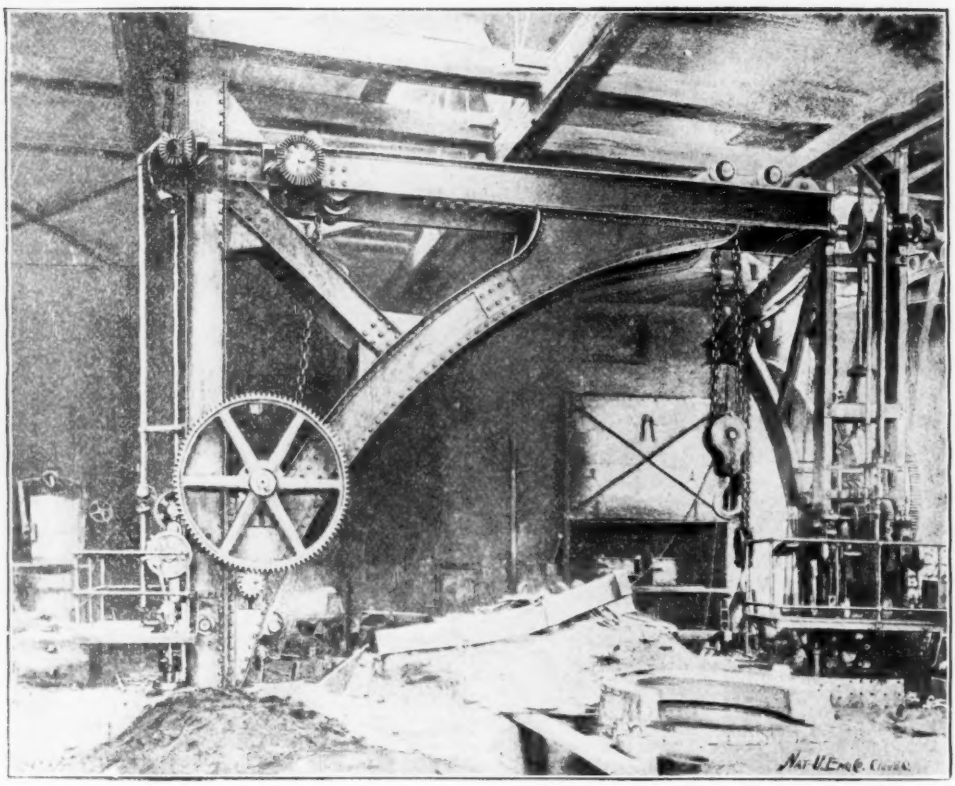
CRAIG RIDGWAY & SON

COATESVILLE, PA.

JOHN J. SHIPHERD, Pres. W. RUSSELL, Vice-Pres. and Mgr.
L. C. SHIPHERD, Sec'y and Treas.

THE

Phœnix Iron Works Co.



MANUFACTURERS

Hand, Steam, Belt, Hydraulic and Electric Cranes

FOR ALL PURPOSES.

Foundry Ladles, Chains, and General Machinery

WASON STREET.

CORRESPONDENCE SOLICITED. WRITE FOR CATALOGUE.

CLEVELAND, OHIO.

Eastern Office: HARRY W. JENNINGS, Agt., Fulton and Cliff Sts. NEW YORK, N. Y.
New England Office: THE JOHN WALES CO., 139 and 141 High St. BOSTON, MASS.

Aluminum

INGOTS, SHEETS, RODS, WIRE.

COWLES No. 1 ALUMINUM ALLOY.

Nearly as light as pure Aluminum, but considerably harder and stronger, also casts much better than pure Aluminum. A fine metal for patterns and models. Supplied in ingots.

FERRO ALUMINUM. . .

For use in iron and steel castings.

ALUMINUM BRONZE. . .

Any grade, in ingots.

MANGANESE COPPER. . .

A rich alloy of Manganese and copper, from which any desired grade of Manganese Bronze can be made. Supplied in ingots.

MANGANESE BRONZE. . .

For propellor wheels and other castings. Supplied in ingots.

SILICON COPPER. . .

A rich alloy of Silicon and Copper. The addition of from 1½ to 2 lbs. of this alloy to 100 lbs of copper will insure a SOLID COPPER CASTING. Supplied in ingots.

CORRESPONDENCE SOLICITED.

COWLES
Electric Smelting and Aluminum Co.
LOCKPORT, N. Y.

We Can . . Furnish

ANY GRADE OF

Moulding Sand . . .

THAT WILL TURN OUT SMOOTH AND PERFECT

WRITE FOR SAMPLE AND PRICES.

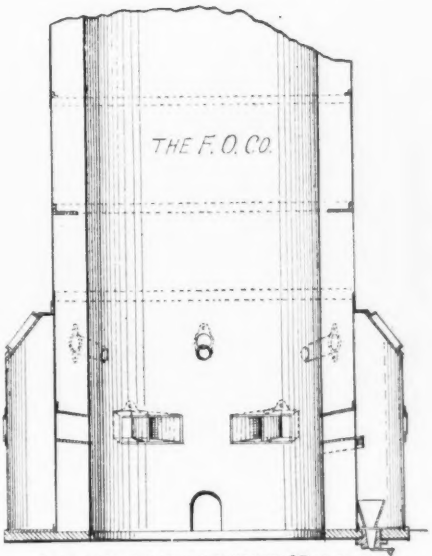
Heavy Machinery Castings
Light Machinery Castings
Agricultural Castings,
Stove Plate Castings,
Malleable Iron Castings,
Light Grey Iron Castings,
Heavy and Light Brass Castings.

WE CAN SUPPLY YOU WITH

FIRE CLAY, FIRE SAND, CORE SAND, FIRE BRICK. CUPOLA BRICK, BRISTLE BRUSHES, STEEL WIRE BRUSHES, BLOWERS, Etc.

The J. Downerd & Son Co.,

216 MAIN STREET, ZANESVILLE, O.

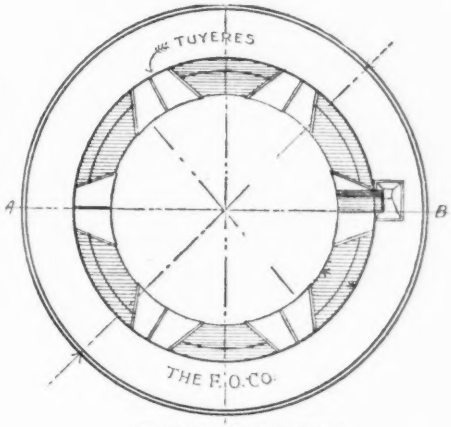


SECTIONAL ELEVATION THROUGH AB OF PLAN.

INVESTIGATE THIS . . . . .

Cupola

BEFORE BUYING ELSEWHERE



PLAN THROUGH TUYERES.

It will Pay

YOU

OUR LINE IS COMPLETE.

OUR PRICES ARE RIGHT.

GIVE US A CHANCE TO QUOTE ON FULL EQUIPMENT OR ANY PART.

The Foundry Outfitting Co.,

WRITE FOR CIRCULAR

DETROIT, MICH.

The WHITING CUPOLA.

PATENTS—August 18, 1885; Ocober 2, 1894.

DON'T buy an infringing imitation when you can get the patented original article for less money.

ALL SIZES: 500 pounds to fifty thousand pounds per hour.

Whiting Foundry Equipment Co.

225 DEARBORN ST., CHICAGO.

FORMERLY

DETROIT FOUNDRY EQUIPMENT CO.

Cranes, Ladles, Tumblers, Trucks, Improved Air Hoists.

BUFFALO BLOWERS.
UNEQUALLED EFFICIENCY, DURABILITY, MINIMUM POWER.
BUFFALO FORGE CO. BUFFALO, N.Y. U.S.A.

BUFFALO FORGES.
AMERICAS BEST. THE WORLDS STANDARD.
BUFFALO FORGE CO. BUFFALO, N.Y. U.S.A.

BUFFALO FAN SYSTEM OF HEATING AND VENTILATING
ALL LARGE BUILDINGS.
BUFFALO FORGE Co. BUFFALO, N.Y. U.S.A.

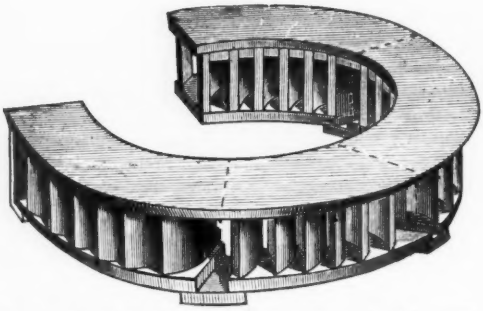
BUFFALO VENTILATING FANS
ELECTRIC, STEAM AND PULLEY TYPES, GREATEST AIR VOLUME, LEAST POWER
BUFFALO FORGE CO. BUFFALO, N.Y. U.S.A.

BUFFALO SHAVING EXHAUSTERS.
FOR HANDLING REFUSE IN ALL WOOD WORKING INDUSTRIES
BUFFALO FORGE Co. BUFFALO, N.Y. U.S.A.

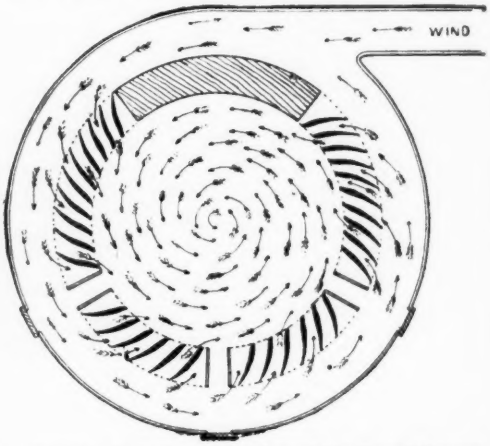
THE REASON WHY

Economy of fuel, rapid melting, the production a uniform grade and strength of iron is attained in the highest possible degree in the BLAKENEY CUPOLA FURNACE is comprehensively shown in the following cuts

Adopted by U. S. Navy Department.



The Combination of Sections of Tuyeres as placed in wall.



Showing direction of Wind through the Curved Tuyeres

Is not our method of introducing the blast into a cupola through **CURVED** tuyeres **MUCH** better than by the combination of upper and lower tuyeres, a series of pipes, or the old fashioned tuyeres? It will pay you to give this matter a little thought if you want the best results obtainable in a cupola. Illustrated catalogue No. 1 tells all about it. Let us send you one.

The Springfield Cupola Co.

SPRINGFIELD, - - - OHIO.

Edwin Harrington, Son & Co.,

INCORPORTED.

DOUBLE CHAIN SCREW HOISTS

500 TO 40,000 LBS. CAPACITY.

Plain and Geared Travelers, Lathes, Planers, Drill Presses.

Send for circular of NEW SAFETY Foundry Crane, safest and best way of handling Moulds, Castings, Ladles.

1521 Pennsylvania Ave., - HILADELPHIA, PA.

"Columbus" Steel Tubular Wheelbarrow.

Made throughout of the best quality of high grade steel. Tray stamped without joint, seam or rivet, with edge bound over steel rod. Handles, Legs and Wheels the strongest put upon Tubular Barrows.

Made in nine different sizes. Largest manufacturers in the United States of TUBULAR BARROWS, STEEL CHARGING BARROWS and WOODEN BARROWS of every variety. Write for catalogue to

The Kilbourne & Jacobs Manufacturing Co.

LINCOLN STREET, COLUMBUS, OHIO.

The Woodruff Patent Separating Machine

Saves all shot and scale iron from foundry refuse. Used, appreciated and commended by Leading Founders in all parts of the country. . .

THE AUDUBON MACHINE WORKS,

NEW HAVEN, CONN.

BUILDERS OF SPECIAL MACHINERY

BUYERS' DIRECTORY.

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AIR HOISTS.
Whiting Foundry Equipment Co.

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Connersville Blower Co., Connersville, Ind.
Root Blower Company, Connersville, Ind.
Sturtevant Company, The B. F., Boston, Mass.
Wilbraham Baker Blower Co., Philadelphia, Pa.

BRONZES.
Cowles Electric Smelting and Aluminum Co., Lockport, N. Y.

BRUSHES.
Rice Mfg. Co., New Durham, N. H.

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Brown & Cochran, 7 Wood St., Pittsburg, Pa.
Stevens, F. B., Detroit, Mich.

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Stewart, W. H.

CORE OVENS.
Millett Core Oven Co., Brightwood, Mass.

CORE OVEN CARS.
Kilbourne & Jacobs Mfg. Co., Columbus, Ohio.

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Harrington, E., Sons & Co., Philadelphia, Pa.
Phœnix Iron Works Co.
Shaw Electric Crane Co., Muskegon, Mich.
Whiting Foundry Equipment Co., Chicago.

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McCullough, Dalzell & Co, Pittsburg, Pa.
Taylor Crucible Co., Philadelphia, Pa.

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Foundry Outfitting Co., The, Detroit.
Springfield Cupola Co., Springfield, Ohio.
Whiting Foundry Equipment Co., Chicago.

FIRE-BRICK.
Garden City Sand Co., Chicago, Ill.
Obermayer Company, The S., Cincinnati, Ohio
Ohio Sand and Clay Company, Columbus, Ohio
Paxson, J. W., & Co., Philadelphia, Pa.
Smith Foundry Supply Company, The J. D., Cincinnati, Ohio.
Stevens, F. B., Detroit, Mich.
Whitehead Bros. Co. New York.

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Obermayer Company, The S., Cincinnati, Ohio.
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Phœnix Iron Works Co.
Stevens, F. B., Detroit, Mich.
Smith Foundry Supply Company, The J. D., Cincinnati, Ohio.
Whitehead Bros. Co. New York.
Whiting Foundry Equipment Co., Chicago.

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Foundry Outfitting Co., The, Detroit, Mich.
Whiting Foundry Equipment Co.

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Smith & Co., J. D., Cincinnati, O.
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Paxson & Co., J. W., Philadelphia, Pa.
Stevens, F. B., Detroit, Mich.
Whitehead Bros., 515-7 West 15th st., New York.

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Smith Pattern Works, Akron, Ohio.
White, Howard, Philadelphia, Pa.

PATTERN LUMBER.
Brown Bros. Chicago, Ills.

PATTERN MAKERS.
The Gobeille Pattern Co., Cleveland, Ohio.
Smith Pattern Works, Akron, Ohio.

RAILROADS.
Big Four.
C. B. & Q. R. R.
Cincinnati, Hamilton, & Dayton, R.R., Cincinnati, O.
Queen and Crescent.

SEPARATING MACHINES.
Audubon Machine Co., New Haven, Conn.

TUMBLING BARRELS.
Paxson & Co., J. W., Philadelphia, Pa.
Whiting Foundry Equipment Co., Chicago.

VENTILATOR IRONS.
Devlin, Thos. & Co. Philadelphia, Pa.

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THE FOUNDRY

The only foundry paper published in the world, and an authority on all matters pertaining to the foundry business.

RATES OF SUBSCRIPTION.

Single subscription to all parts of the United States and Canada, $1 per annum.
" " Universal Postal Union, 1.50 "
Eight or more subscriptions at one time, 75 cents each.

ADVERTISING RATES.

One page - -	per month, $20.00
Half page - - -	" 12.00
Quarter page - -	" 7.00

When space is specified an extra charge of five per cent. on the above figures will be made. All pages between front cover and reading matter reserved for whole page advertisements.

Advertisers in THE FOUNDRY have the privilege of discontinuing their advertisements at any time after they have had three insertions, and will only be charged pro rata for the number of insertions printed. They also have the privilege of changing advertisements as often as desired.

The publishers of THE FOUNDRY appreciate the fact that it is customary for publications, especially the class known as Trade Journals, to quote a rate for advertising from which greater or less discounts are given, according to the persistency of the advertiser. This system is manifestly unfair as tending to show partiality. We have deducted the usual discount before quoting rates, thus giving it to all alike, and no reduction of any sort on the above rates can be made.

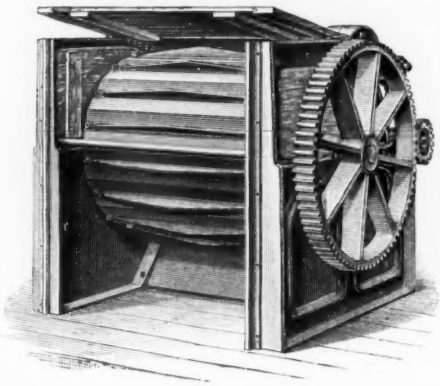
Copy for advertisements should be in by the 25th of the month preceding publication.

Brown & Sharpe Mfg. Co.,

FOUNDRY RATTLERS

DIAMETER.

No. 1—23½ inch
No. 2—31½ inch
No. 3—31½ inch



LENGTH.

No. 1—26 inch
No. 2—31½ inch
No. 3—52 inch

PROVIDENCE, R. I.

Why Wait for Chaplets

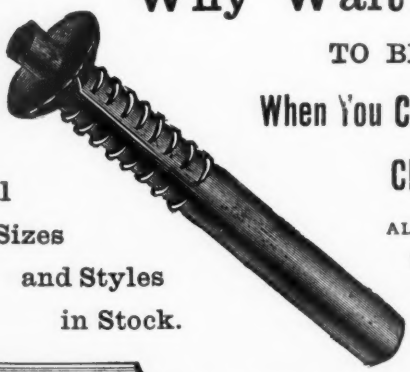
TO BE MADE

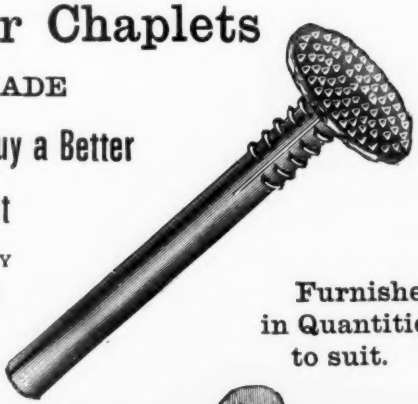
When You Can Buy a Better

Chaplet

ALREADY MADE

All Sizes and Styles in Stock.

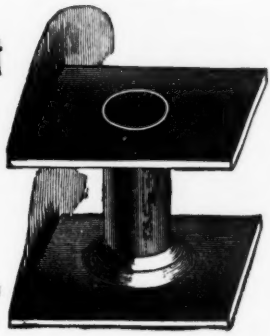




Furnished in Quantities to suit.

For Less than One-Fourth the Cost

TO MAKE THEM?



Send for Illustrated Circular and Price List.

CLEVELAND CHAPLET AND MFG. CO.,

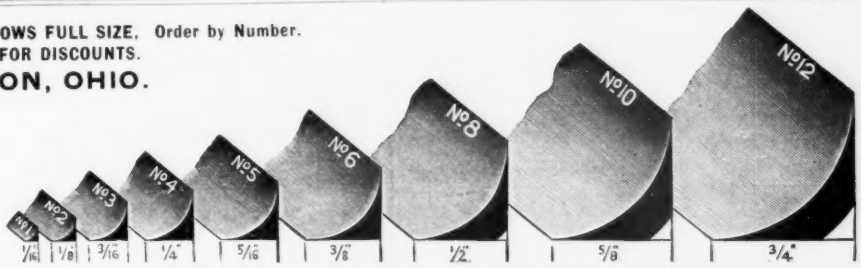
Cleveland, Ohio.

PATTERNS

THE GOBEILLE PATTERN COMPANY, CLEVELAND.

☞You cannot afford to make your own Patterns these times. We can do the work Cheaper, Quicker and Better than any other shop. Write for estimates.

CUT SHOWS FULL SIZE. Order by Number.
WRITE FOR DISCOUNTS.
AKRON, OHIO.



Foundrymen and Everybody, take Notice of SMITH'S LABOR-SAVING LEATHER PATTERN FILLET. Have you seen it? If not, write for a free sample. We have no drummers. We want you to write us and get a sample. **This Means YOU.** UNCLE SAM will deliver you by mail 100 feet of any size from 1-16 in. to ¾ in. radius, for from 5 cents to 25 cents owing to size. UNCLE SAM will not charge Californians more than Ohioans. We charge you UNCLE SAM'S rates. Order by number. **Address all communications to**
101 E. TALMADGE ST.
Smith's Pattern Works, Akron, Ohio.

C H & D

CINCINNATI, HAMILTON & DAYTON R. R.

Only line running Pullman Vestibuled Trains

Cincinnati, Indianapolis,

CHICAGO!

Only direct line between

Cincinnati, Dayton, Lima, Toledo, Detroit and

THE LAKES!

Through Car Service to St. Louis, Springfield, Ills., Koekuk and

THE WEST!

D. G. EDWARDS, G. P. & T. A., Cincinnati, O.

TO **FLORIDA**
& TO NEW ORLEANS
VIA THE
QUEEN & CRESCENT ROUTE

Superb Vestibuled Trains
FROM CINCINNATI

To Lexington, Chattanooga, Birmingham, Meridian, New Orleans, Atlanta, Macon and Jacksonville.

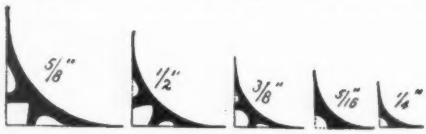
Through Sleeping Cars to Birmingham, Columbus, Albany, Knoxville, Asheville, Jackson, Vicksburg and Shreveport.

Through Tourist Sleeper, Cincinnati to Los Angeles and San Francisco every Thursday. Direct Route to the Southwest via New Orleans or via Shreveport.

3 DAILY TRAINS TO CHATTANOOGA
Send for Literature and Time Tables.

C. A. BAIRD, T. P. A., DETROIT, MICH.
Cor. Woodward and Jefferson Aves.

Prices Greatly Reduced



PATENT

Flexible Metallic Fillet

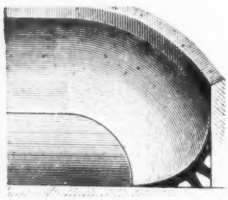
For Pattern Makers' Use.

EIGHT SIZES. ONE MILLION FEET SOLD.

HOWARD WHITE,

Sole Manufacturer,

42 N. 4th St. - PHILADELPHIA, PA.



Easy to apply; handsome finish, durable, economical and most satisfactory, as hundreds have testified.

Improvement in Core Work

W. H. STEWART'S

Founders' Core Compound

Used by the Principal Foundries in the U. S.

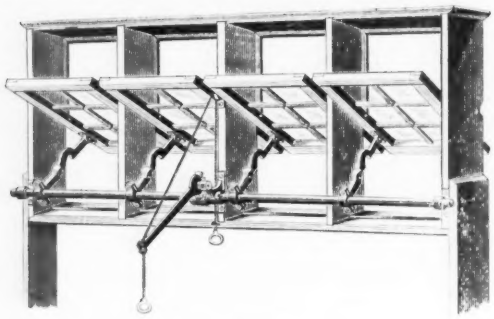
Prepared ready for use in **LIQUID FORM** to be mixed with the regular core sand. The cores are **DAMP-PROOF** and do not absorb moisture. **SPUTTERING** and **BLOWING** by reason of damp cores are avoided. The cores are **HARDER, FIRMER** and **STRONGER** than can be made by any other process and cost less to make. They can be set at any time and **EASILY CLEANED FROM THE CASTING.** Send for our descriptive pamphlet with prices and directions for use.

W. H. STEWART,

SOLE MANUFACTURER.

182 FRONT ST. NEW YORK.

THE NATIONAL SELF-LOCKING VENTILATOR IRONS



PATENTED JANUARY 15, 1889.

For Foundries, Annealing Shops, Blacksmith Shops, Dye Houses, Abattoirs, Medical Colleges, Weave Sheds, Green Houses, Rolling Mills, Glass Works and all places where Ventilators are used.

Simple, always in order and always Locked, whether open or closed; no slamming.

Manufactured and for Sale by

THOMAS DEVLIN & CO.

Lehigh Ave. and 3rd St., PHILADELPHIA, PA.

CIRCULAR SENT ON APPLICATION.

Just Out

New Edition of

MACHINERY PATTERN MAKING

Revised and Enlarged by—

P. S. DINGEY

Foreman Pattern Maker and Draftsman.

A Practical Book ..

containing valuable information and suggestions to machinery builders as well as pattern makers and molders; profusely illustrated with 417 fine engravings . . . . . .

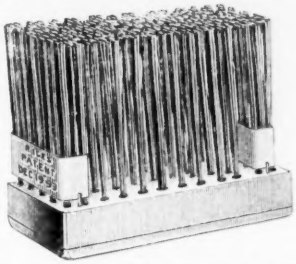
PLUMBAGO FACINGS.

PLUMBAGO Facings have come to stay. The value of plumbago facings, when rightly made, is unquestioned, But who can tell when they are rightly made? Plumbago can be adulterated with soapstone or talc, so as to deceive even the elect. The safety of the foundryman lies in buying his plumbago at headquarters, where no facings except plumbago facings are made—and mixing his facings to suit his wants. What is more, it is cheaper for him to do so. If any foundryman will write us, we will tell him how it is done and we will sand samples and prices of **Pure Plumbago Facings.**

Jos. Dixon Crucible Co., JERSEY CITY, New Jersey.

The Rice Pat. Casting Brush

IT IS BY FAR THE BEST, THE BRIDLES SAVE THE BREAKING.



IT WILL OUTLAST THREE OF ANY OTHER KIND.

MADE ONLY BY

The Rice Mfg. Co.,

NEW DURHAM, N. H.

Makers of Revolving and Plain Casting Brush, Brushes for Cleaning Steam and Hot Water Furnaces, Flue Cleaners, etc., also Steam and Hydraulic Packing.

CATALOGUE FREE.

The A B C of Iron.

The best book for foundrymen published. It is issued in handsome cloth binding, and gives much valuable matter on how to reduce cost of mixtures, and on grading and numbering of pig-iron.

FORMER PRICE $2.00

NOW $1.00.

Order Now of

Foundry Publishing Co.

Griswold Street,

DETROIT, - - MICH.

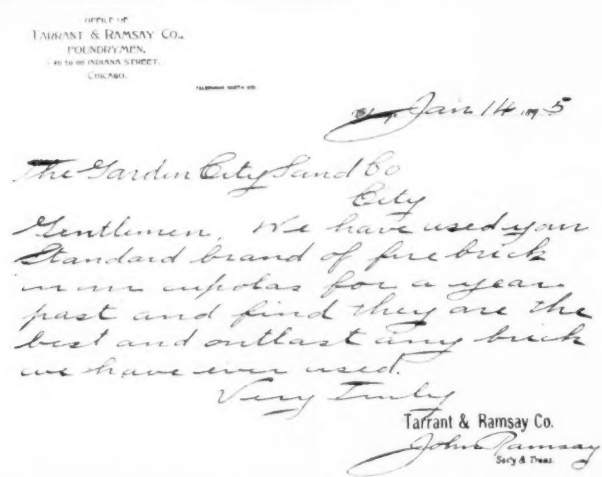
THE REASON WHY

.. YOU SHOULD USE ..

"Standard" Cupola Blocks

IS BECAUSE THEY ARE BETTER AND CHEAPER THAN OTHERS.

READ THIS


OFFICE OF
TARRANT & RAMSAY CO.
FOUNDRYMEN,
46 to 66 INDIANA STREET,
CHICAGO.

Jan 14 1905

The Garden City Sand Co
City
Gentlemen, We have used your Standard brand of fire brick in our cupolas for a year past and find they are the best and outlast any brick we have ever used.
Very Truly
Tarrant & Ramsay Co.
John Ramsay
Secy & Treas.

See what one of the Leading Chicago Foundries say about "Standard" Cupola Blocks. Can you afford to allow your competitors to have the "best of it."

IN ADDITION TO THE ABOVE, PLEASE REMEMBER WHEN YOU WANT

Moulding Sand, Fire Brick, Facings, Shovels, Brushes, Riddles, Blakeny Cupolas, Etc.,

TO BE SURE AND GET OUR PRICES.

WE GUARANTEE EVERYTHING WE SELL. WHY NOT WRITE US.

GARDEN CITY SAND CO.

FIFTH AVENUE AND MADISON STREET,

SECURITY BUILDING. CHICAGO.

"The Proof of the Pudding is in the Eating." . . . . . .

NO MORE CONVINCING CLAIM THAT OUR

FOUNDRY FACINGS, AND FOUNDRY SUPPLIES, PLUMBAGO, GRAPHITE OR SILVER LEAD, ARE THE

Best in the World

THAN our Record for **1894**, taken from our Sales Book.

You know full well that 1894 was a tough year on nearly all branches of the Iron Industry. Yet in

1894

We made and sold **11,452,700** pounds of fine Foundry Facings, Plumbago, etc., and sold **868,100** pounds of Foundy Supplies at our Factories in Cincinnati, Chicago and Larimer, Pa.

Our books are open to inspection. We intend to double this proud Record in 1895.

THE S. OBERMAYER CO.

CINCINNATI, O.
CHICAGO, ILLS. LARIMER, PA.
No Charge for Trial Samples.

GEO. P. MILLNS, Pres. and Gen. Mgr. FRANK H. CHAMBERLIN, Sec'y and Treas.

THE CLEVELAND FACING MILL CO.

MANUFACTURERS OF

Finest Grades Foundry Facings Foundry Supplies Foundry Equipments

IMPORTERS AND REFINERS OF

GRAPHITE, PLUMBAGO and INDIA SILVER LEAD.

MAKERS OF THE CELEBRATED

C. F. M. FOUNDERS' PERFECT WASH,
FOR CASTINGS MADE IN LOAM, DRY SAND, SKIN-DRIED, AND CORES OF ANY SIZE.

STOVE PLATE BLACKINGS,

EXTRA HEAVY STOVE PLATE,

CARBONIZED RETURN,

PURE CHARCOAL.

The Cleveland Facing Mill Co.,

THE FOUNDRY. CLEVELAND, OHIO.

WHITEHEAD BROTHERS COMPANY,

—DEALERS IN—

Moulding Sand, Fire Sand, Philadelphia Sand, French Sand, Fire Clay, Kaolin, and Foundry Facings and Supplies of all Kinds, Lead Facings a Specialty.

515-17 West 15th Street, NEW YORK.

PROVIDENCE OFFICE:
42 S. Water St.

BUFFALO OFFICE:
70 and 72 Columbia St.

WORKS AT

Cheesequake Creek, N. J.
South River, N. J.
Raritan River, N. J.
South Amboy, N. J.
Wareham, Mass
Centre Island, L. I.
Waterford, N. Y.
Albany, N. Y.
Cedar Hill, N. Y.
Coxsackie, N. Y.
Clinton Point, N. Y.
Athens, N. Y.
Coeymans, N. Y.
Willow Springs, N. Y.
Poughkeepsie, N. Y.
Crescent, N. Y.

IMPORTERS OF

CEYLON LEAD

WRITE FOR PRICES.

BITUMINOUS
To mix with the Sand.
CHARCOAL
For Dusting, Wet Blacking, and Brass Work.
ANTHRACITE
For Dusting and Blacking Large Cores.
GERMAN BLACK LEAD
For Very Heavy Machinery and Loam Work.
X MINERAL
For Light and Heavy Machinery and General Work.
XX MINERAL
For Car Wheels and Heavy Machinery.
SOAPSTONE
For Stove Plate and Light Castings.
RICH CEYLON, or SILVER LEAD
For Loam Work and Piano Plate.
STOVE PLATE FACING
For Stoves, Sinks and Hardware.
PIPE BLACKING
For Blacking Pipe Cores.

MANUFACTURERS

Foundry Supplies, Facings and Equipments.

MINERS AND SHIPPERS

Lumberton, Albany and other Grades Moulding Sands.

Open Hearth Steel Sands, Ground Silica Rock, Mold Wash, Etc.

J. W. PAXSON & CO.

PHILADELPHIA, PA.

ESTABLISHED 1872. INCORPORATED 1895.

McCullough= Dalzell Company

MANUFACTURERS OF . . .

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FOR STEEL MELTING
FOR BRASS MELTING
FOR FILE TEMPERING

COVERS
SKIMMERS
DIPPING CUPS

CAPS
STIRRERS
PHOSPHORIZERS

STOPPERS

FOR BESSEMER PLANTS
FOR OPEN HEARTH PLANTS
For CLAPP-GRIFFITH PLANTS

SLEEVES
MUFFLES

NOZZLES
DOMES

PLUMBAGO ARTICLES OF ALL SORTS USED . IN . MELTING . STEEL, . BRASS, ALUMINUM, GOLD AND SILVER . . . . .

The co-partnership heretofore existing under the firm name of McCullough, Dalzell & Co., has been dissolved by mutual consent so as to become incorporated. The business carried on by said firm will be continued by the undersigned Corporation.

McCULLOUGH= DALZELL COMPANY

Office and Works:
36th Street and A. V. Ry.

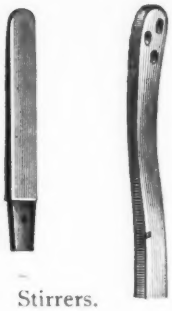
PITTSBURGH, PA., U. S. A.

Crucible.

Crucible

Dipper.

Jewelers'.



Stirrers.

Cover.

Cover.

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Crucibles

For melting STEEL, BRASS, COPPER, GOLD AND ALL OTHER METALS. We are the only PRACTICAL MEN in our business and we work strictly by CHEMICAL ANALYSIS; our CRUCIBLES will be found UNIFORM and RELIABLE at all times; they are well known all over this country and also Europe; send us a trial order and we will secure you as a customer. Also FINE GRAPHITE for LUBRICATING PURPOSES, for the devolopement of High Speed and Great Power. Our GRAPHITE is the purest in the market as Analysis will prove.

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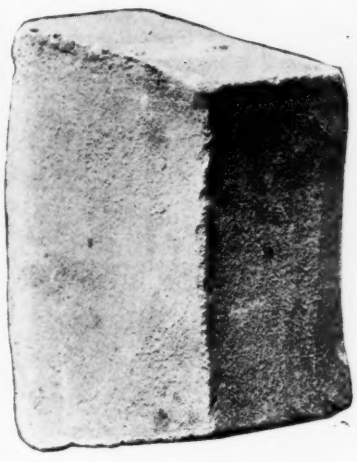
1900 to 1916
CALLOW HILL STREET, PHILADELPHIA, PA.



The Acme Cupola Block

Not any higher in price than other high grade Fire Brick, but much better for Cupola Lining, because they are made to

Stand the Wear and Tear, As well as the Highest Heats.

High grade brick are usually soft and wear away easily, while a hard brick seldom has the required refractory qualities and melts. With the ACME BLOCK we overcome these faults. They neither melt or crumble easily in the cupola.

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OHIO'S CHOICEST GRADES.

GLENFORD No. 10—For Stove Plate, Hollow Ware, Malleable Iron and Light Castings. No. 4 and 5 for Light Machinery, Soil Pipe, General Jobbing, etc.

SANDUSKY No. 1—Fine open grade for Agricultural and General Castings. No. 2 (The new Sandusky) a strong grade, excellent wearing qualities.

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The Ohio Sand and Clay Co.

THE FOUNDRY. COLUMBUS, O.

You are making a mistake

IF YOU ARE NOT BUYING YOUR
MOLDING SAND AND FIRE CLAY OF

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TWELVE YEARS' EXPERIENCE

In Mining and Shipping SAND and CLAY, enables us to ship you just what you need. We can send you any grade of MOLDING SAND you may require, from the finest to the coarsest, and guarantee quality always the same. Order our No. 0 Sand for Brass Castings; our No. 1 for Light Work; our No. 2 for Medium Heavy Stove Plate; our No. 3 for Medium Weight Castings, Light Machinery and Car Wheels; Our No. 4 is the best sand in use for Heavy Castings of any kind. It is an extra good wearer and is always sure to turn out a perfect casting.

Ask for
SAMPLES and PRICES.

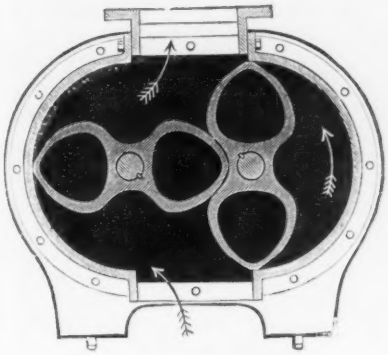
MOLDING SAND
FIRE SAND
CORE SAND
CRUSHED ROCK AND
FIRE CLAY

MOST PROMPT ATTENTION TO CORRESPONDENCE AND SHIPMENTS.
GIVE US A TRIAL ORDER AND WE WILL PLEASE YOU.

E. M. AYERS

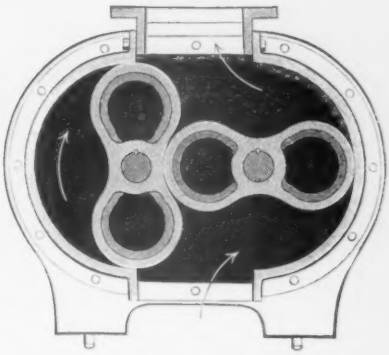
108 MAIN STREET, ZANESVILLE, O.

Roots' Positive Pressure Blowers



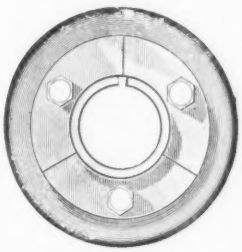
1859

1895

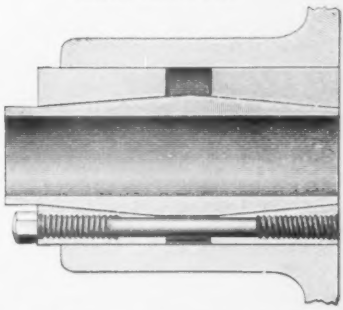


Roots' Standard Blower.
Best adapted to all kinds of smelting purposes, forced draught or suction.

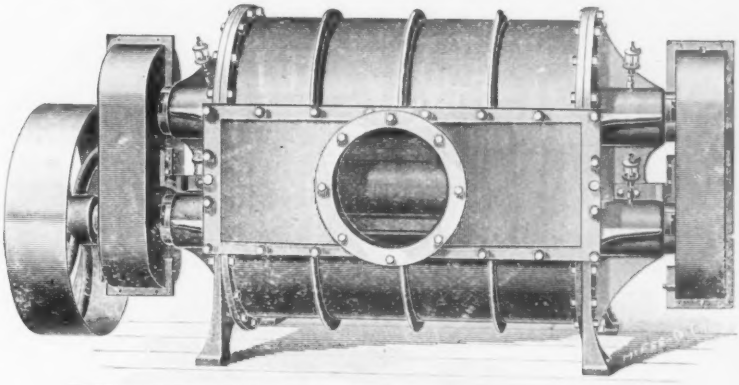
Roots' True Circle Blower.
Best adapted to high pressures, pneumatic tubes, etc.



Mechanical Construction Unequalled. Top, Bottom or Side Discharge.



THE ONLY PERFECT JOURNAL BOX FOR POSITIVE PRESSURE BLOWERS.



P. H. & F. M. Roots Co.,

Connersville, Indiana.

—ESTABLISHED 1859—

ROOTS' POSITIVE
PRESSURE BLOWER

Superior to All Others.

The principles upon which our Blowers are constructed are so different from competing machines that we are enabled to design and construct them in such a manner that, with proper attention, the maximum degree of efficiency can be maintained their entire life-time. We have Blowers in operation to-day which have been running for twenty-five years.

Compared to the Blowers we built twenty-five years ago, those we build to-day are far superior in every respect, so that it is impossible for our present machines to gradually deteriorate, as others do, the longer they are used.

Naturally, the high standard of mechanical excellence to which we have brought our latest improved machine, is the result of our efforts for the last thirty-five years to reach this point.

The only positive pressure blower that can be run at a high speed with perfect safety.

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Connersville, Indiana.

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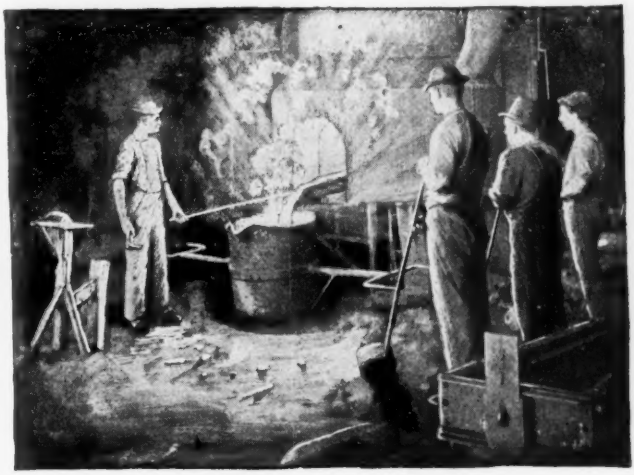
FRASER & CHALMERS, SPECIAL AGENTS, CHICAGO, ILL.



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ANY GRADE OF

Moulding Sand ...

THAT WILL TURN OUT SMOOTH AND PERFECT

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Heavy Machinery Castings
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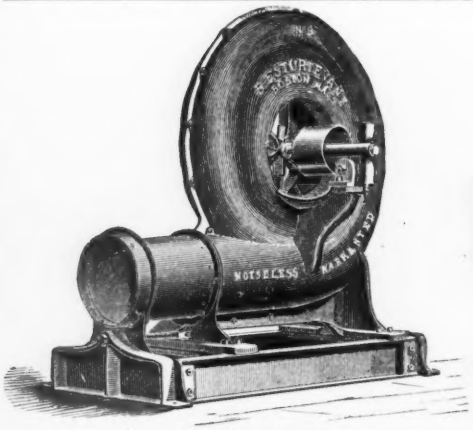
FIRE CLAY, FIRE SAND, CORE SAND, FIRE BRICK. CUPOLA BRICK, BRISTLE BRUSHES, STEEL WIRE BRUSHES, BLOWERS, Etc.

The J. Downerd & Son Co.,

216 MAIN STREET, ZANESVILLE, O.



Blower on Adjustable Bed.

THE STURTEVANT STEEL Pressure Blowers,

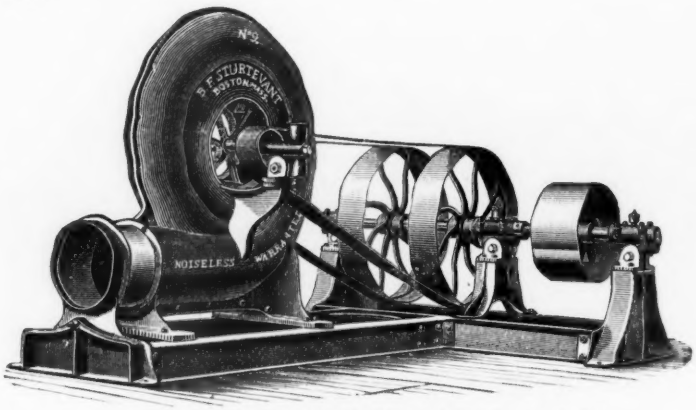
—FOR—

Cupola Furnaces and Forge Fires.

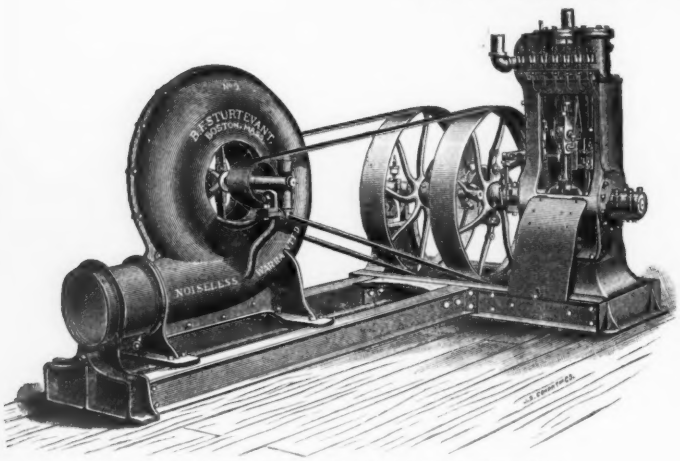
BLOWERS

Furnished without Bed with Separate Countershaft

BLAST GATES



Blower on **Adjustable** Bed with Combined Countershaft.



Blower on Adjustable Bed with Double Enclosed Engine.

BLOWERS

WITH

THE STURTEVANT

Direct Connected

Electric Motors

Send for Catalogue.

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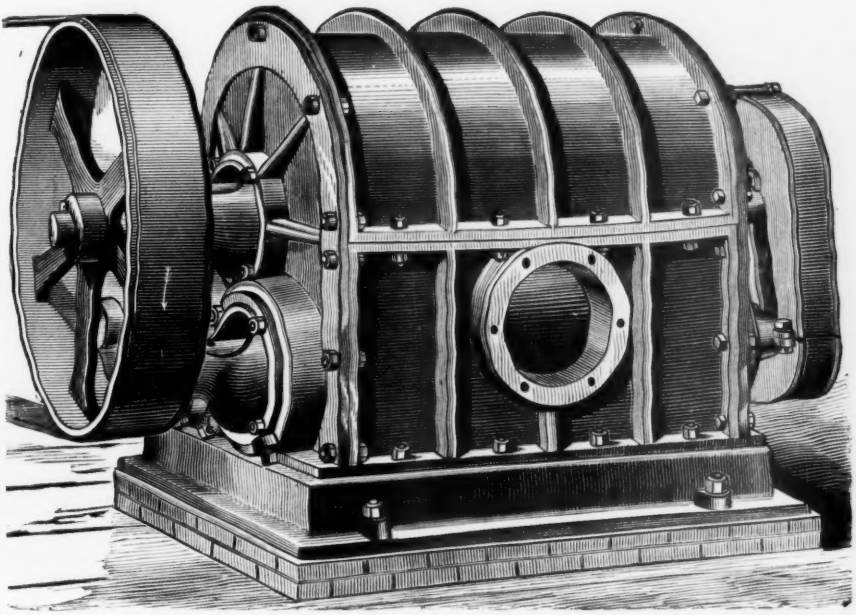
The Baker Rotary Pressure Blower

ONLY ONE BELT IS REQUIRED TO DRIVE THE LARGEST BLOWER.



The Best POSITIVE PRESSURE BLOWER for IRON FOUNDRY CUPOLAS, Pneumatic Tubes, Water Gas Works, Smelting Silver, Lead, or Copper Ores, Sand Blast, Forge or Knobling Fires, Ventilating Mines or Tunnels, or any other purpose requiring a POSITIVE BLAST OR EXHAUST.

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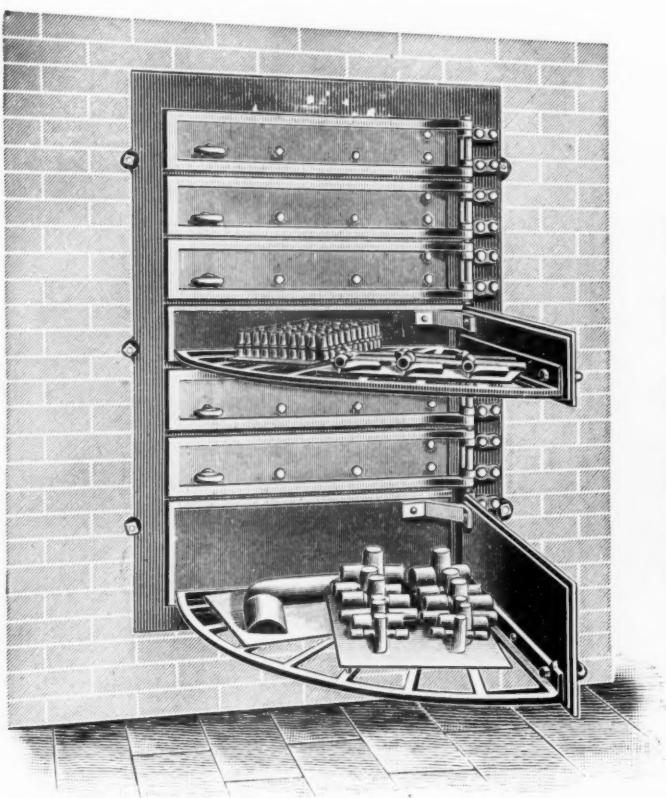
Millett's Patent Core Oven

—With—

Double Doors, one at the back of shelf closing the oven when wide open.

Patented July 19, 1887.

Saves Fuel
Saves Expense
Saves Time
Does more work
Makes Better
CORES.



If you Make Small Cores you Need it

One Hundred in use and every one gives satisfaction.

Write us for circulars and prices.

Millett Core Oven Co.,

Brightwood, Mass.

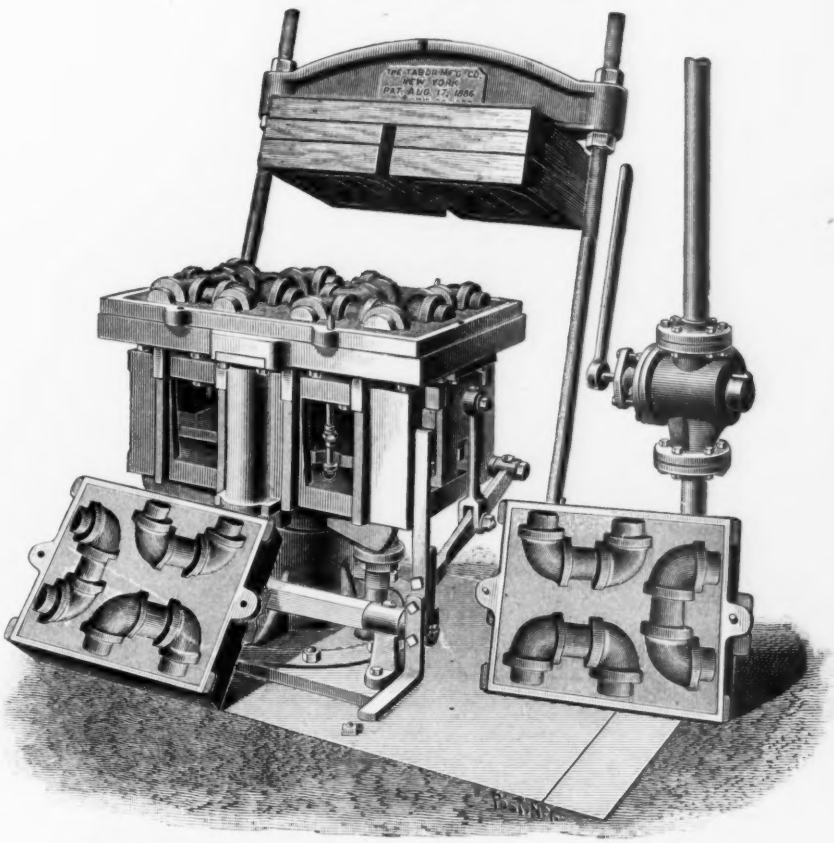
FOR SALE BY J. W. PAXSON & CO., PHILADELPHIA, PA.

The Tabor Manufacturing Co.,

—MANUFACTURERS OF—

AUTOMATIC MOLDING MACHINES

For Sand Molds for Metal Castings.



AUTOMATIC DUPLEX MOLDING MACHINE.

Molds both parts of flask at one operation of machine, thus making two machines in one.

These machines are adapted to general castings when made in reasonable quantities.

The use of these machines is a guarantee of economy, greater quantity and better quality in castings.

Foundrymen who are interested in producing cheap castings of superior quality are invited to correspond with the Company and call at the works, Front and Franklin Streets, Elizabeth, N. J., and see the machines in operation.

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GEO. H. SAGE, Secretary

BURR K. FIELD, Vice-President.
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ENGINEERS, ARCHITECTS

—AND BUILDERS OF—

Iron and Steel Bridges, Roofs and Buildings.

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Office and Works, - - EAST BERLIN, CONN.

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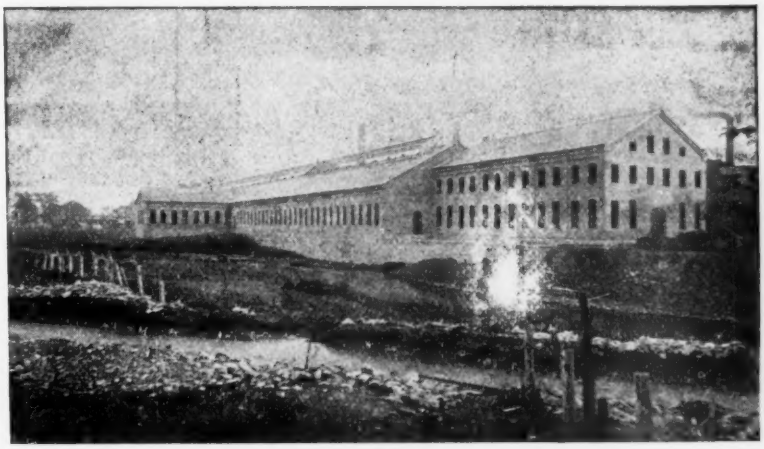
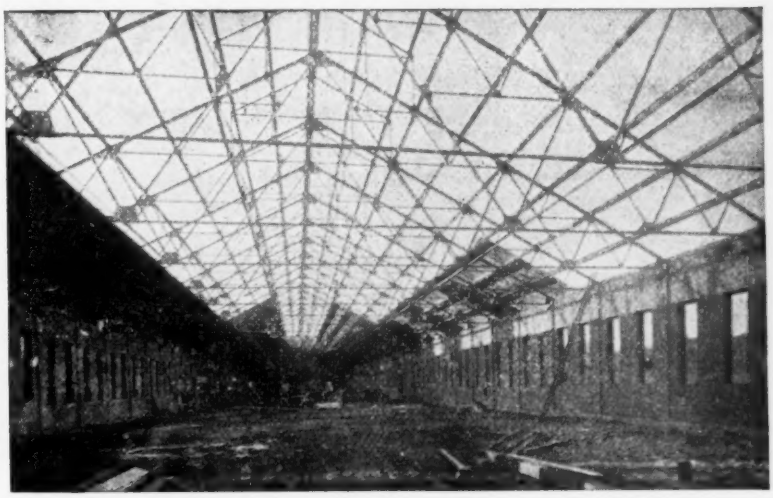
DESIGNERS AND BUILDERS IN
IRON AND STEEL
FIRE PROOF BUILDINGS



FOR
FOUNDRIES, MACHINE SHOPS
ETC., ETC.

Exterior of Foundry of Warder, Bushnell & Glessner Co., Springfield, Ohio.

Traveling and Jib Cranes for handling
Heavy Castings and Machinery.



Buildings Designed for Special
Requirements.

Interior Foundry Building of Warder, Bushn & Glessner Co., Springfield, Ohio.

The roof of this building was erected by the Wrought Iron Bridge Co., Canton, Ohio, and consists of steel trusses supporting wooden purlins to which matched and dressed sheeting is nailed for slating. Trusses being 18 ft. above the floor, the wood work of roof is out of danger from fire, while the cover being of slate a suitable cornice to protect the overhanging of roof from flying sparks, or heat from the burning of neighboring buildings, renders this structure absolutely fire proof. Windows are set in the sides of ventilator throughout its entire length, so that ample light and ventilation is insured.

Wrought Iron Bridge Co.

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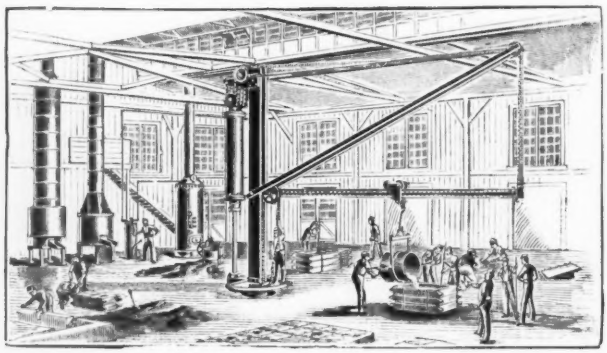
CANTON, O. KANSAS CITY, MO. CHICAGO, ILL.

136 Liberty St., NEW YORK.



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Moulders

do 50 per cent. more work under the Ridgway Crane, for the same wages, than any other, and do it easier and better.

That's what they say. If it's true it ought to settle you. If you don't believe it ask them yourself. Here they are, lots of them, each side of you. Reckon you know some of them.

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(CAPITAL PAID-UP $250,000.)

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Sulphus,	.86
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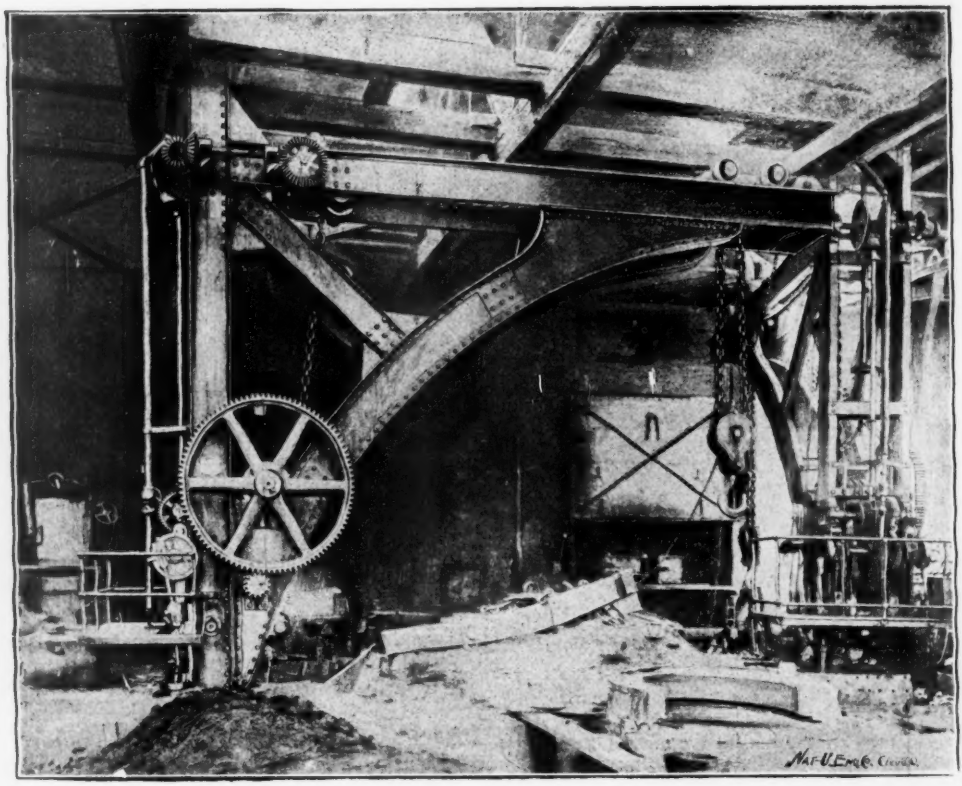

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For detailed information and for large county maps of the territory covered by the Burlington lines write to, or call upon **GEO. H. ROSS, Superintendent, INDUSTRIAL DEPARTMENT BURLINGTON ROUTE, General Offices, ADAMS AND FRANKLIN STREETS, CHICAGO.**

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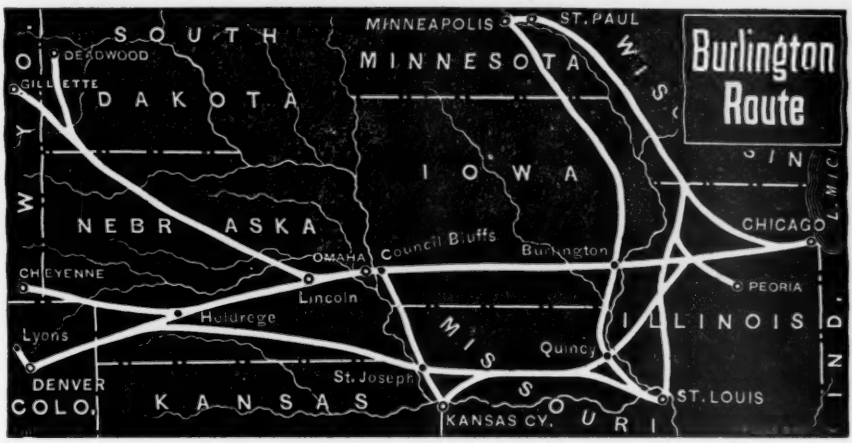

FROM CHICAGO AND ST. LOUIS TO

ST. PAUL, MINNEAPOLIS, OMAHA, KANSAS CITY, DENVER,

And all Points in Colorado, Utah and California,

P. S. EUSTIS, Gen'l Pass'r and Ticket Agent,
CHICAGO, ILLINOIS.

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A large, handsome Map of the United States, mounted and suitable for office or home use, is issed by the Burlington Route. Copies will be mailed to any address on receipt of twelve cents in postage by P. S. Eustis, Gen'l Pass. Agt., C. B. & Q. R. R., Chicago, Ill.

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You can obtain a pack of best quality playing cards by sending fifteen cents in postage to P. S. Eustis Gen'l Pass. Agt., C. B. & Q. R. R., Chicago, Ill.

The Edw. P. Allis Co.

Milwaukee, Wis. have the largest foundry (exclusively for machinery castings,) in the United States. Its interior is shown by the following cut. . . . .

The daily melt is from 60 to 90 tons. All the heavy work is done under and handled by **THREE** thirty ton

Shaw Electric Traveling Cranes,

The first of which was put in operation in 1889, the second in 1891 and the third in 1893. Besides these, there are three more Shaw Cranes in the erecting and machine shops.

These Crane are Made Only by

THE SHAW ELECTRIC CRANE CO.

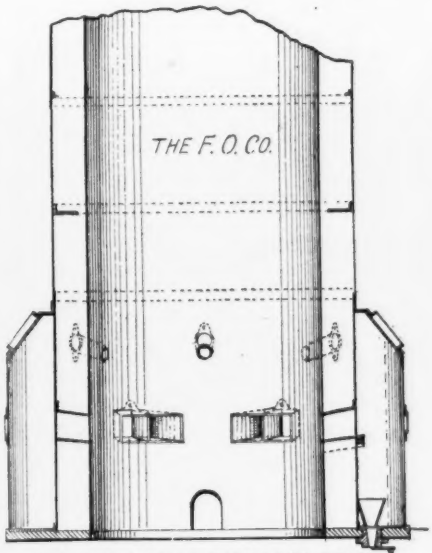
MUSKEGON, MICH.

——And Sold Only by——

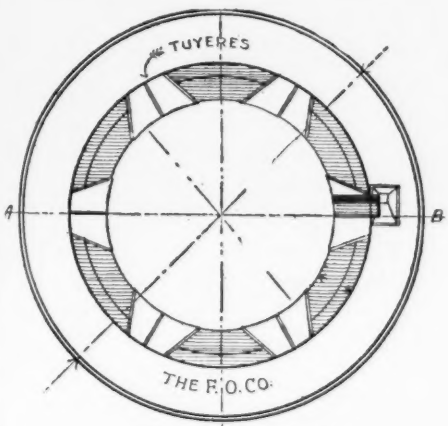
Manning, Maxwell & Moore,

424 TELEPHONE BUILDING, PITTSBURG.

60 S. CANAL ST., CHICAGO, ILL. **111 LIBERTY ST., NEW YORK.**



SECTIONAL ELEVATION THROUGH AB OF PLAN.



PLAN THROUGH TUYERES.

INVESTIGATE THIS . . . . .

Cupola

BEFORE BUYING ELSEWHERE

It will Pay

YOU

OUR LINE IS COMPLETE.

OUR PRICES ARE RIGHT.

GIVE US A CHANCE TO QUOTE ON FULL EQUIPMENT OR ANY PART.

The Foundry Outfitting Co.,

WRITE FOR CIRCULAR.

DETROIT, MICH.

The WHITING CUPOLA.

PATENTS—August 18, 1885; Ocober 2, 1894.

DON'T buy an infringing imitation when you can get the patented original article for less money.

ALL SIZES: 500 pounds to fifty thousand pounds per hour.

Whiting Foundry Equipment Co.

225 DEARBORN ST., CHICAGO.

FORMERLY

DETROIT FOUNDRY EQUIPMENT CO.

Cranes, Ladles, Tumblers, Trucks, Improved Air Hoists.

BUFFALO
BLOWERS.
UNEQUALLED
EFFICIENCY, DURABILITY,
MINIMUM POWER.
BUFFALO FORGE CO.
BUFFALO, N.Y.
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BUFFALO FORGES.
AMERICAS BEST.
THE WORLD'S STANDARD.
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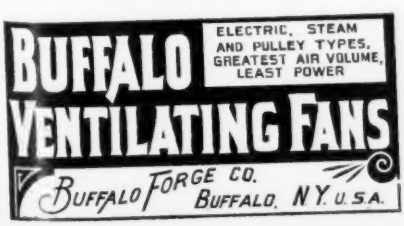
BUFFALO FAN SYSTEM
OF HEATING AND
VENTILATING
ALL
LARGE
BUILDINGS.
BUFFALO
FORGE CO.
BUFFALO, N.Y.
U.S.A.


BUFFALO
VENTILATING FANS
ELECTRIC, STEAM
AND PULLEY TYPES,
GREATEST AIR VOLUME,
LEAST POWER
BUFFALO FORGE CO.
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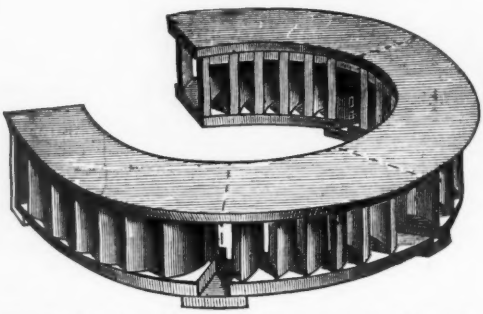
BUFFALO
SHAVING
EXHAUSTERS.
FOR
HANDLING
REFUSE IN ALL WOOD
WORKING INDUSTRIES
BUFFALO
FORGE CO.
BUFFALO, N.Y. U.S.A.

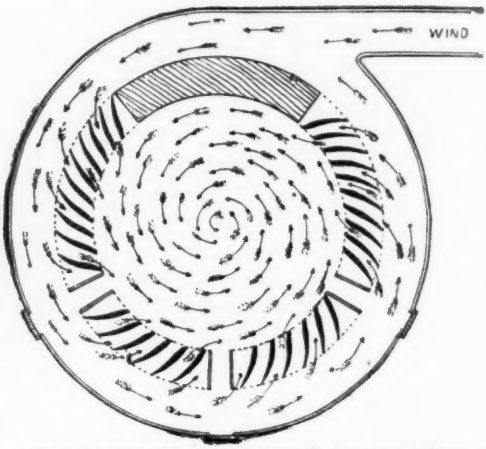
THE REASON WHY

Economy of fuel, rapid melting, the production a uniform grade and strength of iron is attained in the highest possible degree in the BLAKENEY CUPOLA FURNACE is comprehensively shown in the following cuts

Adopted by U. S. Navy Department.



The Combination of Sections of Tuyeres as placed in wall.



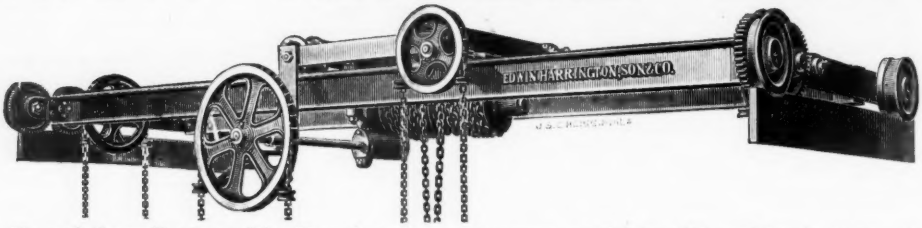
Showing direction of Wind through the Curved Tuyeres

Is not our method of introducing the blast into a cupola through **CURVED** tuyeres **MUCH** better than by the combination of upper and lower tuyeres, a series of pipes, or the old fashioned tuyeres? It will pay you to give this matter a little thought if you want the best results obtainable in a cupola. Illustrated catalogue No. 1 tells all about it. Let us send you one.

The Springfield Cupola Co.

SPRINGFIELD, - - - OHIO.

SAFETY TRAVELING CRANE.



Especially well adapted for Foundry use or wherever careful handling of loads is required. Thus copes and moulds can be lifted and transported with absolute safety. There is no jumping of chains; no jarring of load; no loss of sand; no breaking down of mould.

Will Hold the Load at any Point.

The chains wind on a drum, having right and left spiral threads. The hand chain wheel is removed from the line of the load by means of extended shaft, a fact which is of great advantage to the operator. The crane is supplied with roller bearings and travels with an easy steady movement. It is equally well adapted for heavy or light loads.

Let us give you an estimate. State required span and capacity.

LATHES, DRILLS, PLANERS, GEAR CUTTING, DOUBLE CHAIN SCREW HOISTS.

Edwin Harrington, Son & Co.

INCORPORATED.

1521 Pennsylvania Ave. - PHILADELPHIA, PA

"Columbus" Steel Tubular Wheelbarrow.

Made throughout of the best quality of high grade steel. Tray stamped without joint, seam or rivet, with edge bound over steel rod. Handles, Legs and Wheels the strongest put upon Tubular Barrows.

Made in nine different sizes. Largest manufacturers in the United States of TUBULAR BARROWS, STEEL CHARGING BARROWS and WOODEN BARROWS of every variety. Write for catalogue to

The Kilbourne & Jacobs Manufacturing Co.

LINCOLN STREET, COLUMBUS, OHIO.

The Woodruff Patent Separating Machine

Saves all shot and scale iron from foundry refuse. Used, appreciated and commended by Leading Founders in all parts of the country. . .

THE AUDUBON MACHINE WORKS,

NEW HAVEN, CONN.

BUILDERS OF SPECIAL MACHINERY

BUYERS' DIRECTORY.

ALUMINUM.
Cowles Electric Smelting and Aluminum Co.

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Connersville Blower Co., Connersville, Ind.
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Rice Mfg. Co., New Durham, N. H.
Brand, S. H. & Co., Chicago, Ills.

COKE.
Brown & Cochran, 7 Wood St., Pittsburg, Pa.
Stevens, F. B., Detroit, Mich.

CORE COMPOUNDS.
Stewart, W. H.

CORE OVENS.
Millett Core Oven Co., Brightwood, Mass.

CORE OVEN CARS.
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Phœnix Iron Works Co.
Shaw Electric Crane Co., Muskegon, Mich.
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CRUCIBLES.
Joseph Dixon Crucible Co., Jersey City, N.J.
McCullough, Dalzell & Co, Pittsburg, Pa.
Taylor Crucible Co., Philadelphia, Pa.

CUPOLAS.
Foundry Outfitting Co., The, Detroit.
Springfield Cupola Co., Springfield, Ohio.
Whiting Foundry Equipment Co., Chicago.

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Ayers, E. M., Zanesville, O.
Garden City Sand Co., Chicago, Ill.
Obermayer Company, The S., Cincinnati, Ohio
Ohio Sand and Clay Company, Columbus, Ohio
Paxson, J. W., & Co., Philadelphia, Pa.
Smith Foundry Supply Company, The J. D., Cincinnati, Ohio.
Stevens, F. B., Detroit, Mich.
Whitehead Bros. Co. New York.

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Obermayer Company, The S., Cincinnati, Ohio.
Paxson & Co., J. W., Philadelphia, Pa.
Phœnix Iron Works Co.
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Smith Foundry Supply Company, The J. D., Cincinnati, Ohio.
Whitehead Bros. Co. New York.
Whiting Foundry Equipment Co., Chicago.

FOUNDRY PLANS.
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Foundry Outfitting Co., The, Detroit.
Joseph Dixon Crucible Co. Jersey City, N. J.
Garden City Sand Co., Chicago, Ill.
Obermayer Company, The S., Cincinnati, Ohio.
Paxson & Co., J. W., Philadelphia, Pa.
Stevens, F. B., Detroit, Mich.
Smith & Co., J. D., Cincinnati, O.
Whitehead Bros. Co. New York.

IRON BUILDINGS.
Berlin Iron Bridge Company, East Berlin, Conn.
Wrought Iron Bridge Company, Canton, Ohio.

JAPANS.
Cleveland Varnish Co., Cleveland, O.

MANGANESE AND SILICON.
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MOLDING MACHINES.
Tabor Mfg. Company, 113 Liberty st., New York

MOLDING SAND.
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Foundry Outfitting Co., The, Detroit.
Garden City Sand Co., Chicago, Ill.
Paxson & Co., J. W., Philadelphia, Pa.
Stevens, F. B., Detroit, Mich.
Whitehead Bros., 515-7 West 15th st., New York.

PATTERN FILLETS.
Smith Pattern Works, Akron, Ohio.
White, Howard, Philadelphia, Pa.

PATTERN MAKERS.
The Gobeille Pattern Co., Cleveland, Ohio.
Smith Pattern Works, Akron, Ohio.

PATTERN MAKERS SUPPLIES.
Milwaukee Foundry Supply Co, Milwaukee, Wis.

PATTERN TRIMMERS.
Fox Machine Co, Grand Rapids, Mich.

RAILROADS.
Big Four.
C. B. & Q. R. R.
Cincinnati, Hamilton, & Dayton, R.R., Cincinnati, O.
Queen and Crescent.

SEPARATING MACHINES.
Audubon Machine Co., New Haven, Conn.

SNAP FLASKS.
Adjustable Snap Flask Co., Liberty, Ind.

SPRUE CUTTERS.
Gould & Eberhardt, Newark, N. J.

TUMBLING BARRELS.
Paxson & Co., J. W., Philadelphia, Pa.
Stover Mfg. Co., Freeport, Ills.
Whiting Foundry Equipment Co., Chicago

VARNISHES.
Cleveland Varnish Co., Cleveland, O.

VENTILATOR IRONS.
Devlin, Thos. & Co. Philadelphia, Pa.

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THE FOUNDRY

The only foundry paper published in the world, and an authority on all matters pertaining to the foundry business.

RATES OF SUBSCRIPTION.

Single subscription to all parts of the United States and Canada, $1 per annum.
" " Universal Postal Union, 1.50 "
Eight or more subscriptions at one time, 75 cents each.

ADVERTISING RATES.

One page - -	per month, $20.00
Half page - - -	" 12.00
Quarter page - -	" 7.00

When space is specified an extra charge of five per cent. on the above figures will be made. All pages between front cover and reading matter reserved for whole page advertisements.

Advertisers in THE FOUNDRY have the privilege of discontinuing their advertisements at any time after they have had three insertions, and will only be charged pro rata for the number of insertions printed. They also have the privilege of changing advertisements as often as desired.

The publishers of THE FOUNDRY appreciate the fact that it is customary for publications, especially the class known as Trade Journals, to quote a rate for advertising from which greater or less discounts are given, according to the persistency of the advertiser. This system is manifestly unfair as tending to show partiality. We have deducted the usual discount before quoting rates, thus giving it to all alike, and no reduction of any sort on the above rates can be made.

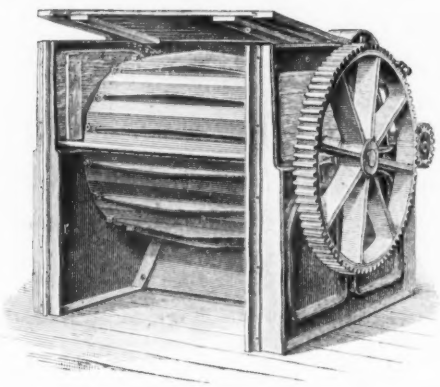
Copy for advertisements should be in by the 25th of the month preceding publication.

Brown & Sharpe Mfg. Co.,

FOUNDRY RATTLERS

DIAMETER.

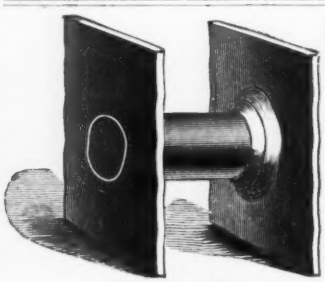
No. 1—23½ inch
No. 2—31½ inch
No. 3—31½ inch



LENGTH.

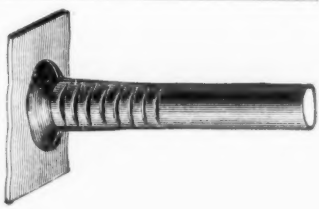
No. 1—26 inch
No. 2—31½ inch
No. 3—52 inch

PROVIDENCE, R. I.



Do Not be Alarmed

We are still in the RING and here to STAY. . .



SEND US YOUR ORDERS

And We will Guarantee the Goods and Prices.

Cleveland Chaplet & Man'g Co.

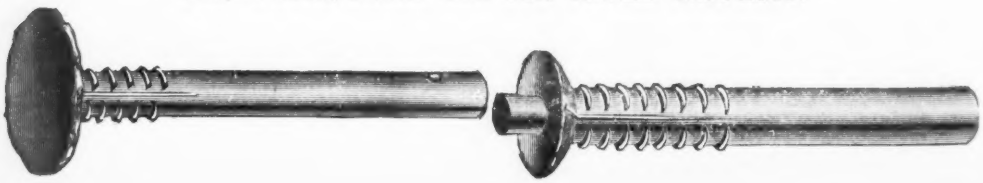
CLEVELAND, O.

MANUFACTURERS OF

CHAPLETS AND CHAPLET STEMS,

Stove Rods, Scrapers, Pokers, Towel Rods, and Nickel Plated Stove Trimmings

FOR WATER-BACKS USE OUR TINNED CHAPLETS.



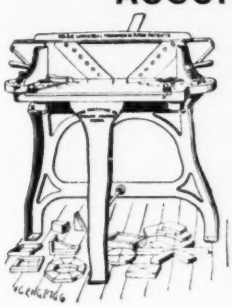
A REVOLUTION

In Pattern Making was the result of the introduction of the

FOX UNIVERSAL TRIMMER

Our first machines were considered marvelous time and money savers, as they saved fully one quarter of the cost of patterns. Our latest machine, **STYLE E,** is a combination of utility and convenience such as our ten years of experience in this line has proved essential and desirable

ACCURATE! POWERFUL! CONVENIENT!



Fox Machine Co.

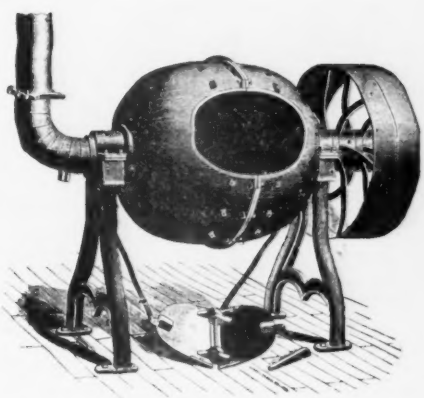
315 North Front Street,

GRAND RAPIDS, - MICH.

Sent out on Trial anywhere in the U. S.

STOVER'S IMPROVED

EXHAUST TUMBLING BARREL



The Stover Egg Shaped Barrel does double the work of any other with less noise and power. It gives the contents a double motion or action—from ends to center and from side to center—causing a thorough mixing and rubbing together of all the parts contained therein, cleaning and polishing the contents better and quicker than any other form of barrel.

Sent on 30 days approval to any responsible manufacturer of light castings, malleable iron, wire nails, or any other small articles that require cleaning and polishing.

For full particulars, address,

Stover Manufacturing Co.

205 RIVER STREET,

FREEPORT, ILL

Black Baking Enamel

AND

AIR DRYING JAPAN

For Light Iron, Hardware, Etc.

Shellac Varnishes

For Patterns.

—THE—

Cleveland Varnish Co.

Makers,

CLEVELAND, - OHIO

CAUTIONARY NOTICE!

All Wire Brushes involving above Principle of Construction are infringements unless they have our Name and Patent Date stamped upon each one.

SEE THAT HINGE?

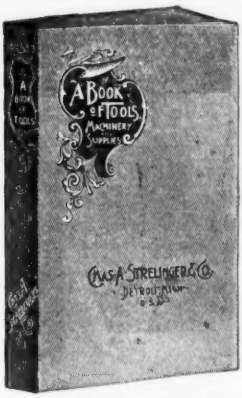
S. H. BRAND & CO. *Sole and Only Supply House Mannfacturing*

Wire and Bristle Brushes, Mallets, Rammers, Shovels, Galvanized and Brass Riddles, Spray Cups, Platers' Brushes, Etc.

99-101 W. Monroe Street, - CHICAGO

"This is the book we long have sought,
And mourned because we found it not."
OLD SONG,

Mr. WM. ULRICH, Mattewan, W. Va., writes us: "I would not do without your 'Book of Tools' for five dollars. It is surely a satisfaction to have such a book of reference. The illustrations and descriptions are so perfect that I would hardly bother to look at the tools if I were in yours shoes, as the catalogue practically answers all questions. I hope in a short time to send you another and larger order."

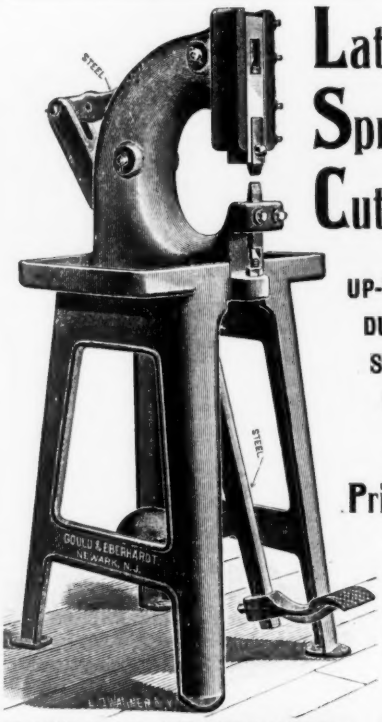


Mr. U. refers to our "Book of Tools," which is perhaps the most complete and comprehensive catalogue of Machinery and Tools ever issued. It contains 540 pages, over 2,000 illustrations, and is sent free to any address upon receipt of 15 cents to cover cost of mailing and advertising.

The publisher of THE FOUNDRY will refund the amount in every case where the recipient is not well satisfied.

CHAS. A. STRELINGER & CO.

98-110 Bates Street. - DETROIT, MICH



Latest Sprue Cutter..

UP-TO-DATE
DURABLE
STRONG
NEAT

Price Low

Send to

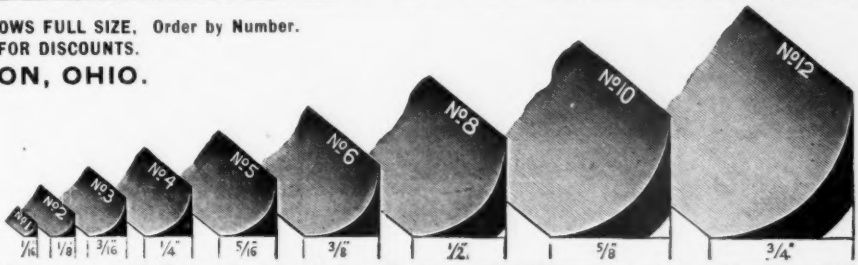
GOULD & EBERHARDT, NEWARK, N. J.

PATTERNS

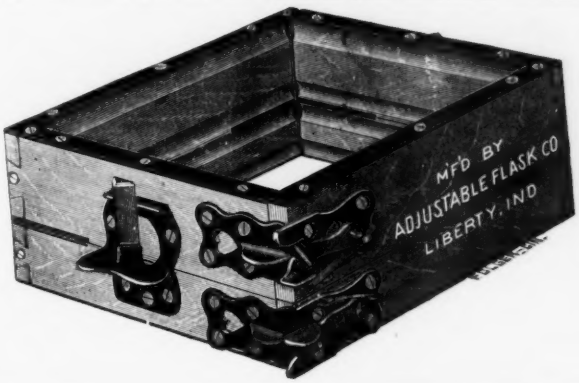
THE GOBEILLE PATTERN COMPANY, CLEVELAND.

☞You cannot afford to make your own Patterns these times. We can do the work Cheaper, Quicker and Better than any other shop. Write for estimates.

CUT SHOWS FULL SIZE. Order by Number.
WRITE FOR DISCOUNTS.
AKRON, OHIO.



Foundrymen and Everybody, take Notice of SMITH'S LABOR-SAVING LEATHER, PATTERN FILLET. Have you seen it? If not, write for a free sample. We have no drummers. We want you to write us and get a sample. **This Means YOU.** UNCLE SAM will deliver you by mail 100 feet of any size from 1-16 in. to ¾ in. radius, for from 5 cents to 25 cents owing to size. UNCLE SAM will not charge Californians more than Ohioans. We charge you UNCLE SAM'S rates. Order by number. **Address all communications to**
101 E. TALMADGE ST.
Smith's Pattern Works, Akron, Ohio.



Snap Flasks . .

All styles and sizes. The cut shows our **Solid Taper Snap Flask** which are unusually light and strongly made of ¾ inch soft maple, well seasoned, fitted with our latest improved hinge and **Automatic Spring Latch.** Tapers ¼ inch to 1 foot, just enough to allow slip boxes to go over molds and fit snug

ADJUSTABLE SNAP FLASK Co

LIBERTY, IND.

SAVE

Your Patterns

Lightning Lifting Screw
Taper Thread

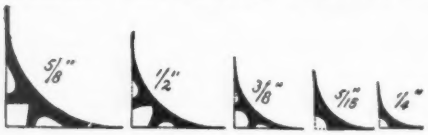
BY USING FRASER'S PATENT RAPPING PLATES AND LIFTING SCREWS.

Pattern Letters and Figures, Flask Clamps and Fittings, Leather Fillet Cutters, Universal Trimmers, Dowel Pins, Etc.

MILWAUKEE FOUNDRY SUPPLY COMPANY,

MILWAUKEE, WIS.

Prices Greatly Reduced



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Flexible Metallic Fillet

For Pattern Makers' Use.

EIGHT SIZES. ONE MILLION FEET SOLD.

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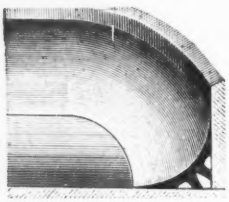
Sole Manufacturer,
42 N. 4th St. - PHILADELPHIA, PA.



Easy to apply; handsome finish, durable, economical and most satisfactory, as hundreds have testified.

Improvement in Core Work

W. H. STEWART'S

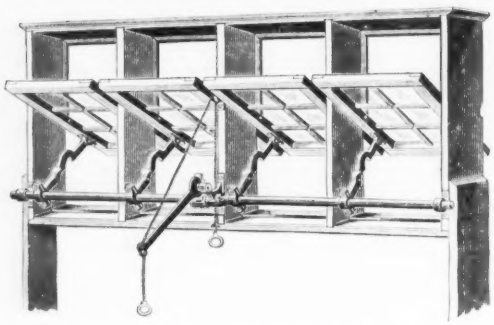
Founders' Core Compound

Used by the Principal Foundries in the U. S.

Prepared ready for use in **LIQUID FORM** to be mixed with the regular core sand. The cores are **DAMP-PROOF** and do not absorb moisture. **SPUTTERING** and **BLOWING** by reason of damp cores are avoided. The cores are **HARDER, FIRMER** and **STRONGER** than can be made by any other process and cost less to make. They can be set at any time and **EASILY CLEANED FROM THE CASTING.** Send for our descriptive pamphlet with prices and directions for use.

W. H. STEWART,
SOLE MANUFACTURER,
182 FRONT ST. NEW YORK.

THE NATIONAL SELF-LOCKING VENTILATOR IRONS



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For Foundries, Annealing Shops, Blacksmith Shops, Dye Houses, Abattoirs, Medical Colleges, Weave Sheds, Green Houses, Rolling Mills, Glass Works and all places where Ventilators are used.

Simple, always in order and always Locked, whether open or closed; no slamming.

Manufactured and for Sale by

THOMAS DEVLIN & CO.
Lehigh Ave. and 3rd St., PHILADELPHIA, PA.
CIRCULAR SENT ON APPLICATION.

A

Good Opportunity

Is offered to start a Profitable Foundry business on land situated on deep tide water, with good opportunities for profitable contracts for castings.

For price of land and other particulars, address

AMASA M. EATON,

PROVIDENCE, - R. I.

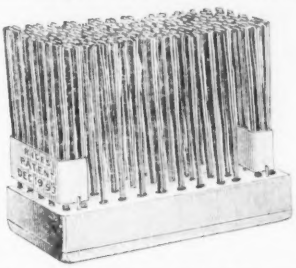
PLUMBAGO FACINGS.

PLUMBAGO Facings have come to stay. The value of plumbago facings, when rightly made, is unquestioned, But who can tell when they are rightly made? Plumbago can be adulterated with soapstone or talc, so as to deceive even the elect. The safety of the foundryman lies in buying his plumbago at headquarters, where no facings except plumbago facings are made—and mixing his facings to suit his wants. What is more, it is cheaper for him to do so. If any foundryman will write us, we will tell him how it is done and we will sand samples and prices of **Pure Plumbago Facings.**

Jos. Dixon Crucible Co., JERSEY CITY, New Jersey.

The Rice Pat. Casting Brush

IT IS BY FAR THE BEST, THE BRIDLES SAVE THE BREAKING.



IT WILL OUTLAST THREE OF ANY OTHER KIND.

MADE ONLY BY

The Rice Mfg. Co.,

NEW DURHAM, N. H.

Makers of Revolving and Plain Casting Brush, Brushes for Cleaning Steam and Hot Water Furnaces, Flue Cleaners, etc., also Steam and Hydraulic Packing.

CATALOGUE FREE.

FLORIDA

And the Sunny South.

VIA

BIG FOUR ROUTE.

The frosty mornings, the chilly nights, are the first warning notes from Winter's trumpet, and we watch the Sun in his southward course, longing to follow him to a land where it is summer always.

Are you going south this winter?

The "Big Four Route" is the best line from Chicago, Peoria, St. Louis, Cleveland, Columbus, Indianapolis, Benton Harbor, Sandusky and intermediate points, with Solid Vestibuled trains, Buffet Parlor Cars, Wagner Sleeping Cars and Dining Cars to Cincinnati, where direct connections are made with solid trains with Pullman Sleeping Cars of the Chesapeake & Ohio, Queen & Crescent Route and Louisville & Nashville Railways, to Hot Springs, Old Point Comfort and all points in Virginia and The Carolines; to New Orleans and all principal cities in the south.

Through Wagner and Pullman Sleeping Cars daily between St. Louis and Washington via the "Big Four" and the picturesque C. & O. Ry.

Tourists rates will be in effect.

Call on or address any Agent of the Big Four Route or its connecting lines, or address

E. O. McCORMICK, Pass'r Traffic Manager,
D. B. MARTIN, Gen. Pass. & Tkt Agt
"BIG FOUR ROUTE" CINCINNATI, O.

THE REASON WHY

.. YOU SHOULD USE ..

"Standard" Cupola Blocks

IS BECAUSE THEY ARE BETTER AND CHEAPER THAN OTHERS.

READ THIS

ILLINOIS MALLEABLE IRON CO.

MANUFACTURERS AND JOBBERS OF

WROUGHT IRON PIPE

Plumbers, Steam, Gas and Water Works Supplies.

MALLEABLE, GRAY IRON AND BRASS CASTINGS TO ORDER.

581 TO 601 DIVERSEY AVENUE

Factories, 581, 599 and 601-609 Diversey Ave. 1482 to 1496 N. Hamilton St.

Telephone, Works, Lake View 72. Telephone, Main 609.

Salesroom, 38 & 39 West Monroe St.

Chicago, Jan. 14, 1895. 189

Garden City Sand Co.,

City.

Gentlemen:-

Replying to your inquiry as to our opinion of your Standard Fire Brick, will say, that we have been using them in our cupola linings for both grey and malleable iron for the past year. We have found them entirely satisfactory and to stand up to their work fully as well as higher priced brick, which we had been formerly using. We shall continue to order from you, as we need them.

We are,

Very truly yours,

Illinois Malleable Iron Co.,

per O. P. Strickel Supt.

See what one of the Leading Chicago Foundries say about "Standard" Cupola Blocks. Can you afford to allow your competitors to have the "best of it."

IN ADDITION TO THE ABOVE, PLEASE REMEMBER WHEN YOU WANT

Moulding Sand, Fire Brick, Facings, Shovels, Brushes, Riddles, Blakeny Cupolas, Etc.

TO BE SURE AND GET OUR PRICES.

WE GUARANTEE EVERYTHING WE SELL. WHY NOT WRITE US.

GARDEN CITY SAND CO.

FIFTH AVENUE AND MADISON STREET,

SECURITY BUILDING. CHICAGO.

"The Proof of the Pudding is in the Eating." . . . . . .

NO MORE CONVINCING CLAIM THAT OUR

FOUNDRY FACINGS, AND FOUNDRY SUPPLIES, PLUMBAGO, GRAPHITE OR SILVER LEAD, ARE THE

Best in the World

THAN our Record for **1894**, taken from our Sales Book.

You know full well that 1894 was a tough year on nearly all branches of the Iron Industry. Yet in

1894

We made and sold **11,452,700** pounds of fine Foundry Facings, Plumbago, etc., and sold **68,100** pounds of Foundy Supplies at our Factories in Cincinnati, Chicago and Larimer, Pa.

Our books are open to inspection. We intend to double this proud Record in 1895.

THE S. OBERMAYER CO.

CINCINNATI, O.
CHICAGO, ILLS. LARIMER, PA.
No Charge for Trial Samples.

GEO. P. MILLNS, Pres. and Gen. Mgr. FRANK H. CHAMBERLIN, Sec'y and Treas.

THE CLEVELAND FACING MILL CO.

MANUFACTURERS OF

Finest Grades
Foundry Facings
Foundry Supplies
Foundry Equipments

IMPORTERS AND REFINERS OF

GRAPHITE, PLUMBAGO and INDIA SILVER LEAD.

MAKERS OF THE CELEBRATED

C. F. M. FOUNDERS' PERFCET WASH,
FOR CASTINGS MADE IN LOAM, DRY SAND, SKIN-DRIED, AND CORES OF ANY SIZE.

STOVE PLATE BLACKINGS,
EXTRA HEAVY STOVE PLATE,
CARBONIZED RETURN,
PURE CHARCOAL.

The Cleveland Facing Mill Co.,

CLEVELAND, OHIO.

WHITEHEAD BROTHERS COMPANY,

—DEALERS IN—

Moulding Sand, Fire Sand, Philadelphia Sand, French Sand, Fire Clay, Kaolin, and Foundry Facings and Supplies of all Kinds, Lead Facings a Specialty.

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CEYLON LEAD

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BITUMINOUS
To mix with the Sand.
CHARCOAL
For Dusting, Wet Blacking, and Brass Work.
ANTHRACITE
For Dusting and Blacking Large Cores.
GERMAN BLACK LEAD
For Very Heavy Machinery and Loam Work.
X MINERAL
For Light and Heavy Machinery and General Work.
XX MINERAL
For Car Wheels and Heavy Machinery.
SOAPSTONE
For Stove Plate and Light Castings.
RICH CEYLON, or SILVER LEAD
For Loam Work and Piano Plate.
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For Stoves, Sinks and Hardware.
PIPE BLACKING
For Blacking Pipe Cores.

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Lumberton, Albany and other Grades Moulding Sands.

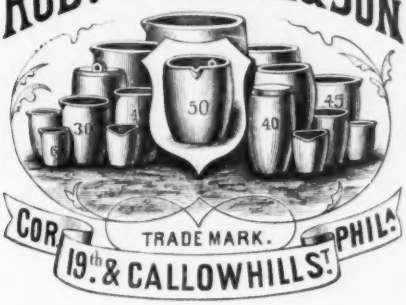
Open Hearth Steel Sands, Ground Silica Rock, Mold Wash, Etc.

J. W. PAXSON & CO.

PHILADELPHIA, PA.

Crucible.

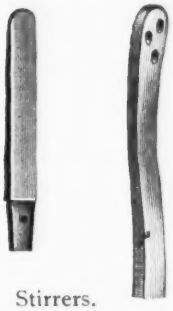
ROBT. J. TAYLOR & SON



Crucible

Dipper.

Jewelers'.


Stirrers.

Cover.

Cover.

Stopper.

Crucibles

For melting STEEL, BRASS, COPPER, GOLD AND ALL OTHER METALS. We are the only PRACTICAL MEN in our business and we work strictly by CHEMICAL ANALYSIS; our CRUCIBLES will be found UNIFORM and RELIABLE at all times; they are well known all over this country and also Europe; send us a trial order and we will secure you as a customer. Also FINE GRAPHITE for LUBRICATING PURPOSES, for the devolopement of High Speed and Great Power. Our GRAPHITE is the purest in the market as Analysis will prove.

ROBT. J. TAYLOR & SON,

1900 to 1916 CALLOW HILL STREET, PHILADELPHIA, PA.

ESTABLISHED 1872. INCORPORATED 1895.

McCullough= Dalzell Company

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FOR STEEL MELTING
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FOR BESSEMER PLANTS
FOR OPEN HEARTH PLANTS
For CLAPP-GRIFFITH PLANTS

SLEEVES
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NOZZLES
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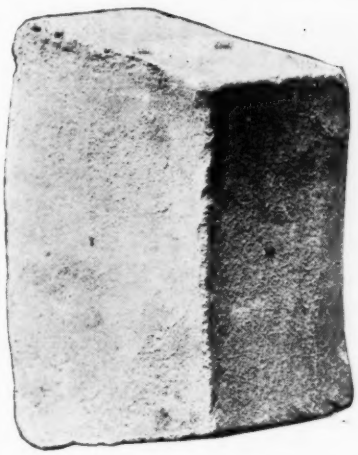
PLUMBAGO ARTICLES OF ALL SORTS USED . IN . MELTING . STEEL, . BRASS, ALUMINUM, GOLD AND SILVER . . . . .

The co-partnership heretofore existing under the firm name of McCullough, Dalzell & Co., has been dissolved by mutual consent so as to become incorporated. The business carried on by said firm will be continued by the undersigned Corporation.

McCULLOUGH= DALZELL COMPANY

Office and Works:
36th Street and A. V. Ry.

PITTSBURGH, PA., U. S. A.

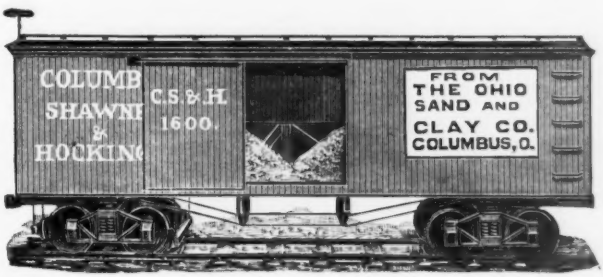


The Acme Cupola Block

Not any higher in price than other high grade Fire Brick, but much better for Cupola Lining, because they are made to

Stand the Wear and Tear, As well as the Highest Heats.

High grade brick are usually soft and wear away easily, while a hard brick seldom has the required refractory qualities and melts. With the ACME BLOCK we overcome these faults. They neither melt or crumble easily in the cupola.



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OHIO'S CHOICEST GRADES.

GLENFORD No. 10—For Stove Plate, Hollow Ware, Malleable Iron and Light Castings. No. 4 and 5 for Light Machinery, Soil Pipe, General Jobbing, etc.

SANDUSKY No. 1—Fine open grade for Agricultural and General Castings. No. 2 (The new Sandusky) a strong grade, excellent wearing qualities.

ZANESVILLE No. 2—Fine for light castings. No. 6 RED—Famous for heavy machinery and other large castings.

RED HILL—The best of fine brass sands.

Always glad to furnish samples and any information in regard to their use. Send for circular showing who use our sands and what they use them for.

The Ohio Sand and Clay Co.

THE FOUNDRY. COLUMBUS, O.

You are making a mistake

IF YOU ARE NOT BUYING YOUR
MOLDING SAND AND FIRE CLAY OF

E. M. AYERS

TWELVE YEARS' EXPERIENCE

In Mining and Shipping SAND and CLAY, enables us to ship you just what you need. We can send you any grade of MOLDING SAND you may require, from the finest to the coarsest, and guarantee quality always the same. Order our No. 0 Sand for Brass Castings; our No. 1 for Light Work; our No. 2 for Medium Heavy Stove Plate; our No. 3 for Medium Weight Castings, Light Machinery and Car Wheels; Our No. 4 is the best sand in use for Heavy Castings of any kind. It is an extra good wearer and is always sure to turn out a perfect casting.

Ask for
SAMPLES and PRICES.

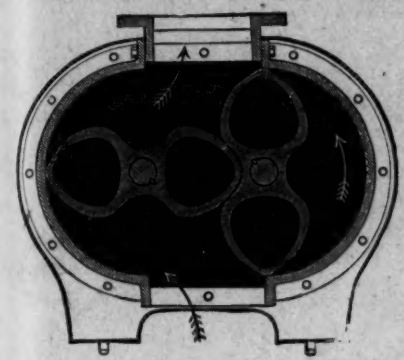
MOLDING SAND
FIRE SAND
CORE SAND
CRUSHED ROCK AND
FIRE CLAY

MOST PROMPT ATTENTION TO CORRESPONDENCE AND SHIPMENTS.
GIVE US A TRIAL ORDER AND WE WILL PLEASE YOU.

E. M. AYERS

108 MAIN STREET, ZANESVILLE, O.

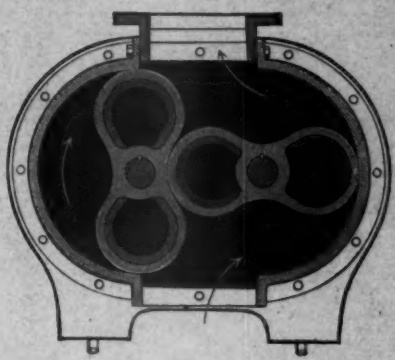
Roots' Positive Pressure Blowers



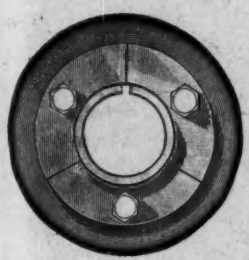
Roots' Standard Blower.
Best adapted to all kinds of smelting purposes, forced draught or suction.

1859

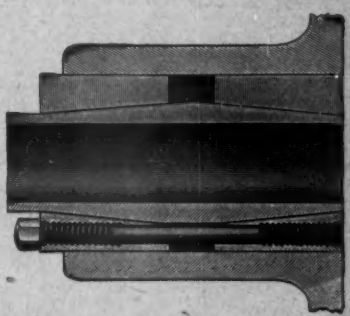
1895



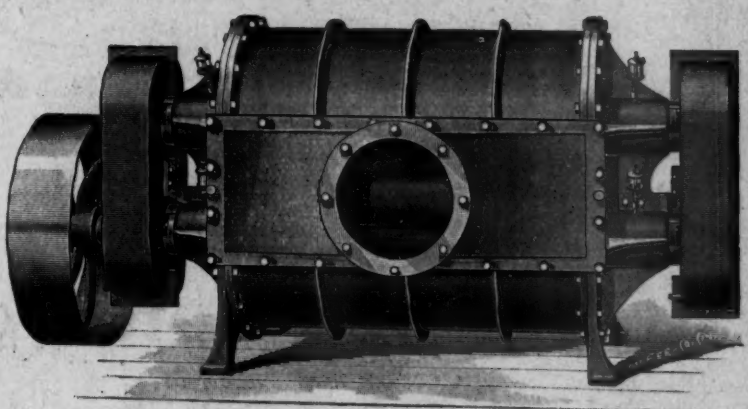
Roots' True Circle Blower.
Best adapted to high pressures, pneumatic tubes, etc.



Mechanical Construction Unequaled. Top, Bottom or Side Discharge.



THE ONLY PERFECT JOURNAL BOX FOR POSITIVE PRESSURE BLOWERS.



P. H. & F. M. Roots Co.,

Connersville, Indiana.

—ESTABLISHED 1859—

ROOTS' POSITIVE
PRESSURE BLOWER

Superior to All Others.

The principles upon which our Blowers are constructed are so different from competing machines that we are enabled to design and construct them in such a manner that, with proper attention, the maximum degree of efficiency can be maintained their entire life-time. We have Blowers in operation to-day which have been running for twenty-five years.

Compared to the Blowers we built twenty-five years ago, those we build to-day are far superior in every respect, so that it is impossible for our present machines to gradually deteriorate, as others do, the longer they are used.

Naturally, the high standard of mechanical excellence to which we have brought our latest improved machine, is the result of our efforts for the last thirty-five years to reach this point.

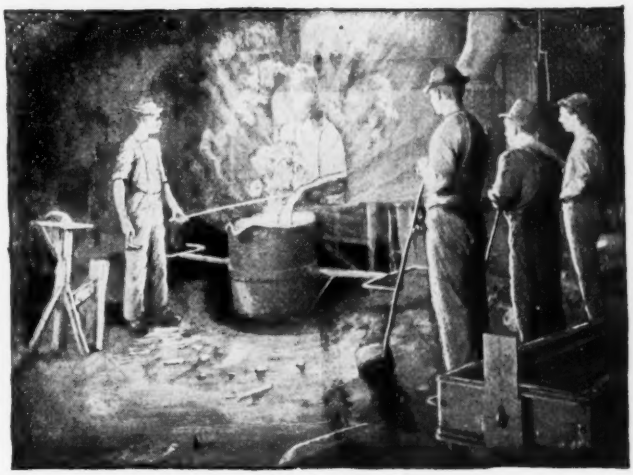
The only positive pressure blower that can be run at a high speed with perfect safety.

WRITE FOR ILLUSTRATED CATALOGUE.

P. H. & F. M. Roots Co.,

Connersville, Indiana.

COOKE & CO., SELLING AGENTS, 163-165 WASHINGTON STREET, NEW YORK
FRASER & CHALMERS, SPECIAL AGENTS, CHICAGO, ILL.



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ANY GRADE OF

Moulding Sand ...

THAT WILL TURN OUT SMOOTH AND PERFECT

WRITE FOR SAMPLE AND PRICES.

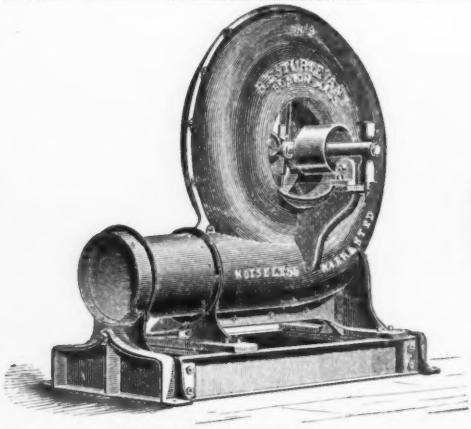
Heavy Machinery Castings
Light Machinery Castings
Agricultural Castings,
Stove Plate Castings,
Malleable Iron Castings,
Light Grey Iron Castings,
Heavy and Light Brass Castings.

WE CAN SUPPLY YOU WITH

FIRE CLAY, FIRE SAND, CORE SAND, FIRE BRICK. CUPOLA BRICK, BRISTLE BRUSHES, STEEL WIRE BRUSHES, BLOWERS, Etc.

The J. Downerd & Son Co.,

216 MAIN STREET, ZANESVILLE, O.



Blower on Adjustable Bed.

THE STURTEVANT STEEL Pressure Blowers,

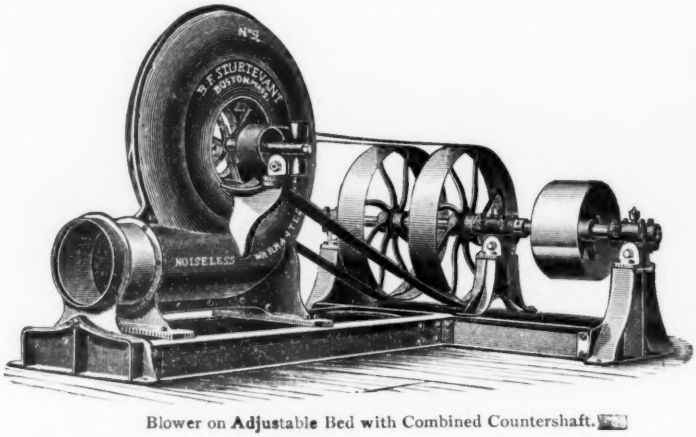
—FOR—

Cupola Furnaces and Forge Fires.

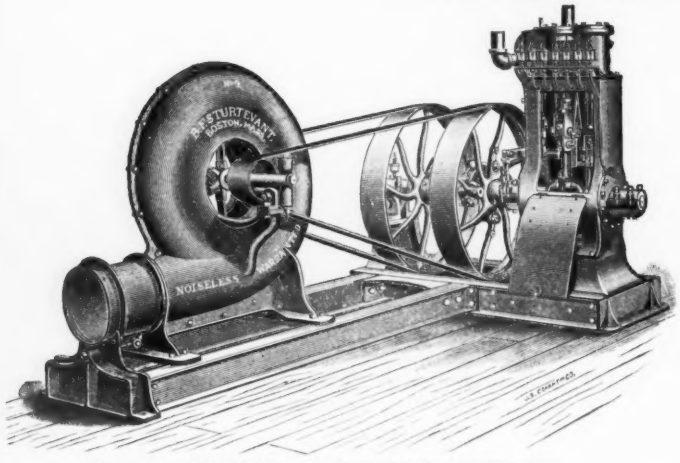
BLOWERS

Furnished without Bed with Separate Countershaft

BLAST GATES



Blower on Adjustable Bed with Combined Countershaft.



Blower on Adjustable Bed with Double Enclosed Engine.

BLOWERS

WITH

THE STURTEVANT

Direct Connected

Electric Motors

Send for Catalogue.

B. F. STURTEVANT CO.,

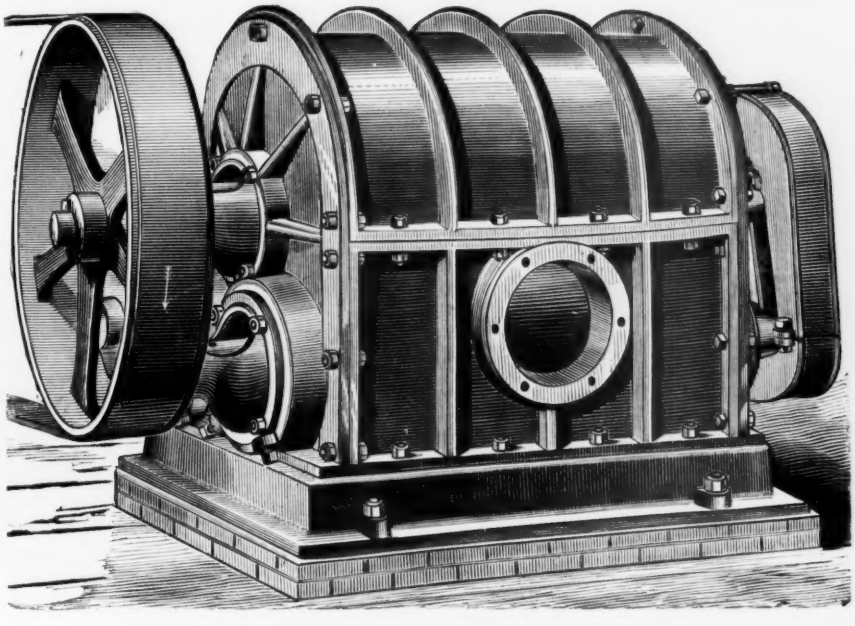
BOSTON, MASS.

91 Liberty Street, NEW YORK. 135 N. Third St. PHILADELPHIA.
16 S. Canal St. CHICAGO. 75 Queen Victoria St. LONDON.

STOCK CARRIED AT BRANCHES.

The Baker Rotary Pressure Blower

ONLY ONE BELT IS REQUIRED TO DRIVE THE LARGEST BLOWER.



The Best POSITIVE PRESSURE BLOWER for IRON FOUNDRY CUPOLAS, Pneumatic Tubes, Water Gas Works, Smelting Silver, Lead, or Copper Ores, Sand Blast, Forge or Knobling Fires, Ventilating Mines or Tunnels, or any other purpose requiring a POSITIVE BLAST OR EXHAUST.

Wilbraham Baker Blower Co.,

2518 Frankford Ave., PHILADELPHIA, PA.

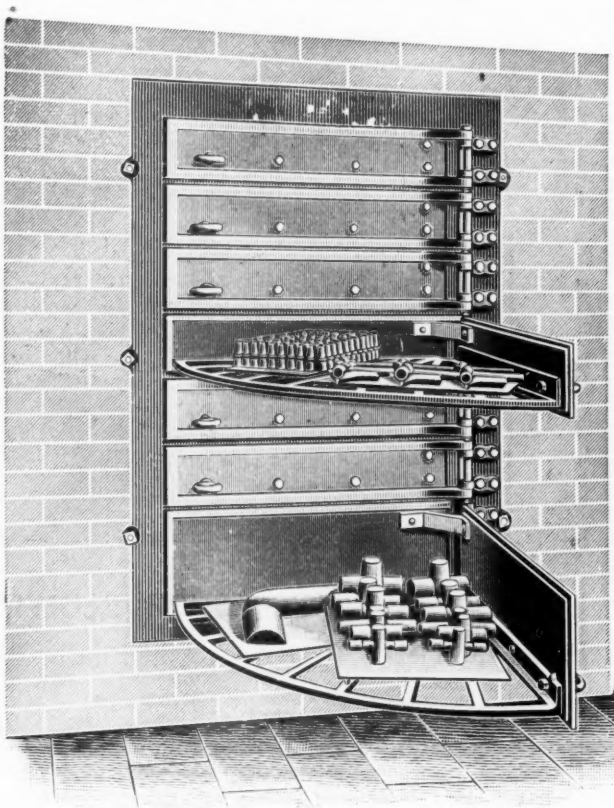
Millett's Patent Core Oven

—With—

Double Doors, one at the back of shelf closing the oven when wide open.

Patented July 19, 1887.

Saves Fuel
Saves Expense
Saves Time
Does more work
Makes Better
CORES.



If you Make Small Cores you Need it

One Hundred in use and every one gives satisfaction.

Write us for circulars and prices.

Millett Core Oven Co.,

Brightwood, Mass.

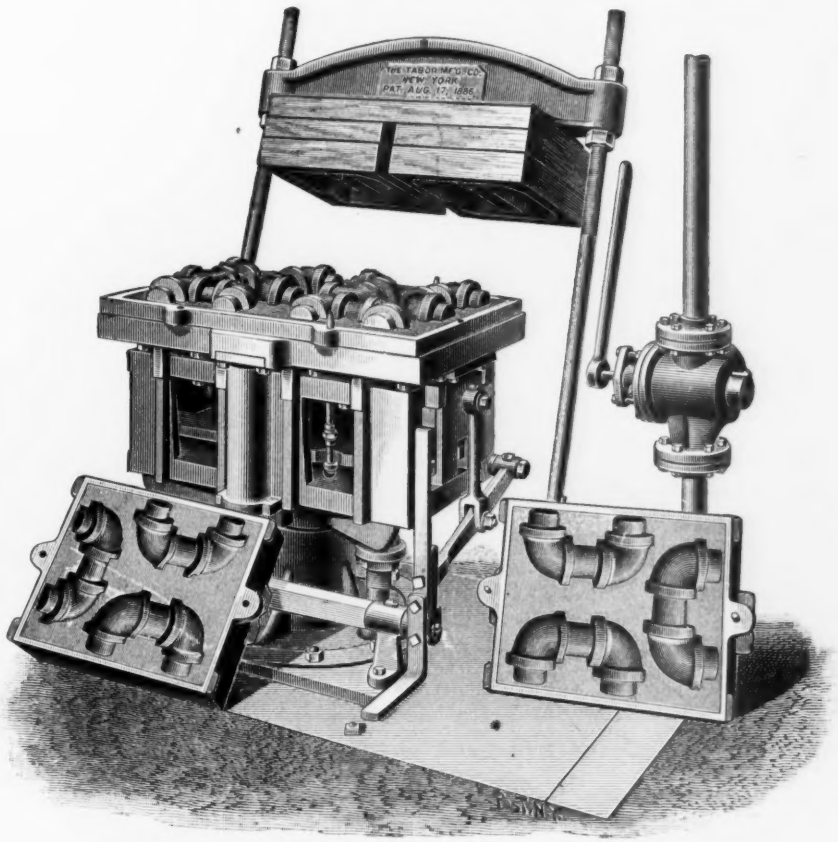
FOR SALE BY J. W. PAXSON & CO., PHILADELPHIA, PA.

The Tabor Manufacturing Co.,

—MANUFACTURERS OF—

AUTOMATIC MOLDING MACHINES

For Sand Molds for Metal Castings.



AUTOMATIC DUPLEX MOLDING MACHINE.

Molds both parts of flask at one operation of machine, thus making two machines in one.

These machines are adapted to general castings when made in reasonable quantities.

The use of these machines is a guarantee of economy, greater quantity and better quality in castings.

Foundrymen who are interested in producing cheap castings of superior quality are invited to correspond with the Company and call at the works, Front and Franklin Streets, Elizabeth, N. J., and see the machines in operation.

113 Liberty Street,

NEW YORK, - - - N. Y.

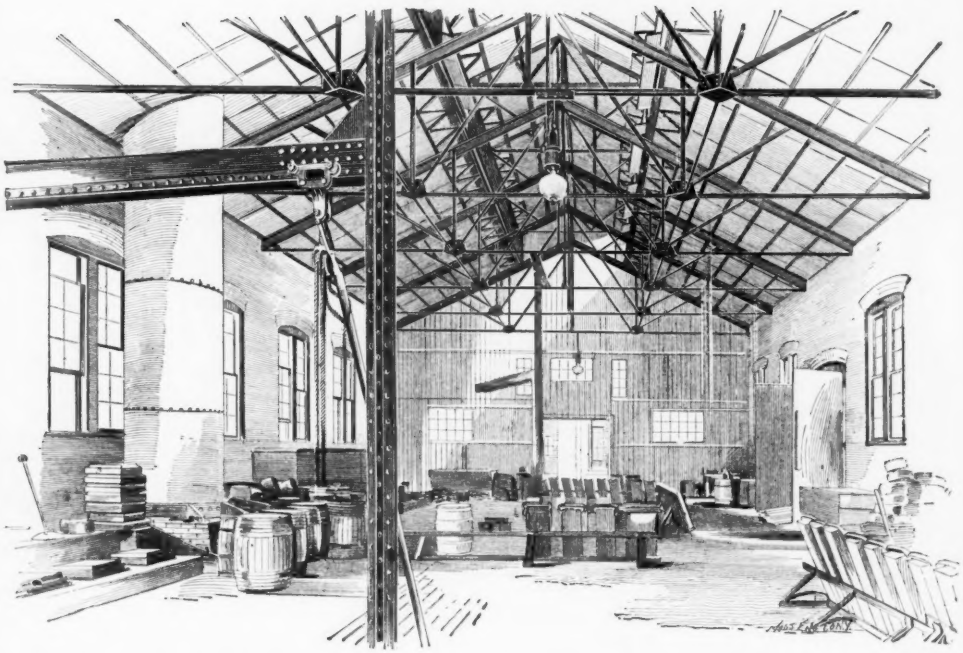
CHAS. M. JARVIS, President and Chief Engineer. BURR K. FIELD, Vice-President.
GEO. H. SAGE, Secretary F. L. WILCOX, Treasurer.

THE BERLIN IRON BRIDGE CO.,

ENGINEERS, ARCHITECTS

—AND BUILDERS OF—

Iron and Steel Bridges, Roofs and Buildings.



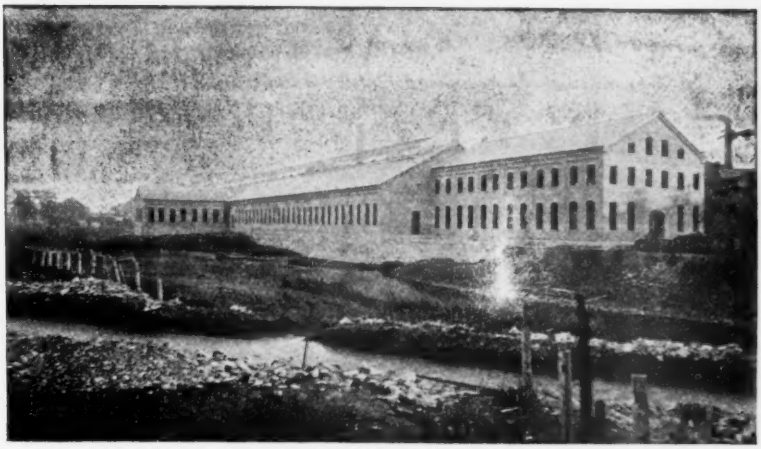
The above illustration is taken direct from a photograph, and shows the interior of a brass foundry designed and built by us for Randolph & Clowes, at Waterbury, Conn. The building is 42 feet in width and 83 feet in length, with brick walls and an iron truss roof covered with our Patent Anti-Condensation Corrugated Iron Roof Covering, which is guaranteed not to sweat or condense moisture on the under side in the coldest weather. The building is ventilated by our Improved Ventilator on the ridge, with Corrugated Iron Shutters opening and closing by cords from the floor.

Office and Works, - - EAST BERLIN, CONN.

SEND FOR ILLUSTRATED CATALOGUE.

Wrought Iron Bridge Co.,

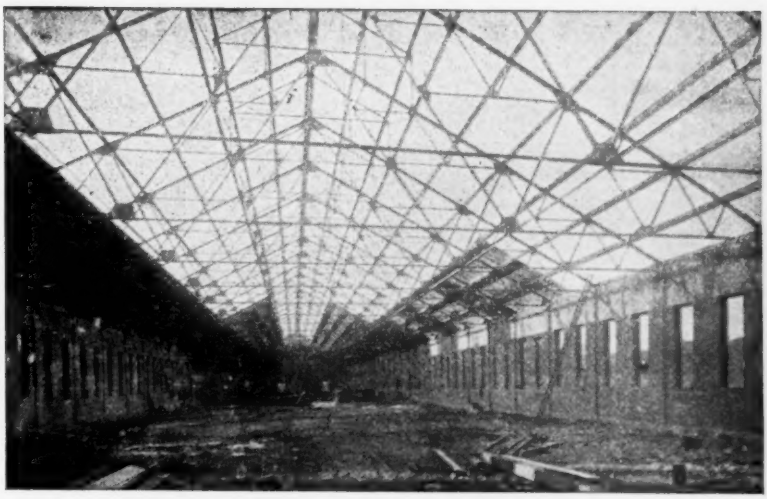
DESIGNERS AND BUILDERS IN
IRON AND STEEL
FIRE PROOF BUILDINGS



— FOR —
FOUNDRIES, MACHINE SHOPS
ETC., ETC.

Exterior of Foundry of Warder, Bushnell & Glessner Co., Springfield, Ohio.

Traveling and Jib Cranes for handling
Heavy Castings and Machinery.



Buildings Designed for Special
Requirements.

Interior Foundry Building of Warder, Bushn & Glessner Co., Springfield, Ohio.

The roof of this building was erected by the Wrought Iron Bridge Co., Canton, Ohio, and consists of steel trusses supporting wooden purlins to which matched and dressed sheeting is nailed for slating. Trusses being 18 ft. above the floor, the wood work of roof is out of danger from fire, while the cover being of slate a suitable cornice to protect the overhanging of roof from flying sparks, or heat from the burning of neighboring buildings, renders this structure absolutely fire proof. Windows are set in the sides of ventilator throughout its entire length, so that ample light and ventilation is insured.

Wrought Iron Bridge Co.

ADDRESS NEAREST OFFICE.

CANTON, O. KANSAS CITY, MO. CHICAGO, ILL.

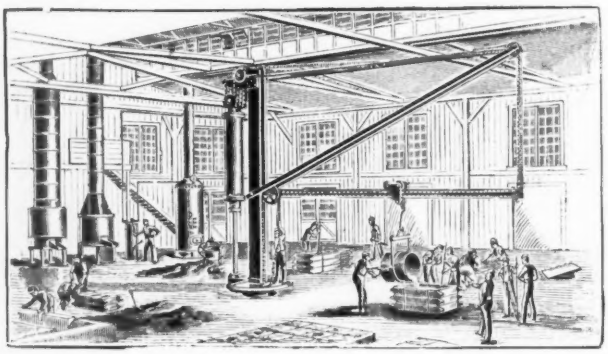
136 Liberty St., NEW YORK.

IF YOU DON'T BELIEVE IT JUST ASK THEM

Ask FOUNDRYMEN who have them in use whether or not

The Moulders can do 40 to 50 per cent. more work with the same Wages than with any other Crane and do it better and easier.

Ask the Steel Works, Pipe Mills, and Rolling Mills if the **Ridgway Cranes** don't do the work while other cranes are getting a "move on." Ask them if it isn't always in order and costless for repairs. Ask them if it isn't the greatest machine for handling goods they ever saw or heard tell of. Why if you could see one of these magnificent cranes at work in Foundry, Mill or Yard, you would just feel like taking your hat off to it. You would indeed. Never have had a man yet who needed a crane and saw one of the **Ridgway Cranes** at work that he didn't order it. We are equipping the best plants right now.



5-ton Ridgway Crane in Foundry Diamond State Iron Co., Wilmington Del.

JUST LOOK!

It is perfectly balanced. You know what that means.

It works at any speed, from that at which your beard grows to a flash of lightning.

It is perfectly safe and every Tom, Dick and Harry works it and cannot injure themselves, the machine or the work.

It is a perfect Hydraulic, but consumes no water and uses so little steam that it is not taken into consideration.

DON'T GET A CRANE UNTIL YOU KNOW ABOUT THE RIDGWAY BALANCED STEAM HYDRAULIC. EVERYBODY IS GETTING THEM. SO SHOULD YOU. OUR ELEVATORS ARE JUST AS GOOD.

SEND FOR CIRCULAR.

CRAIG RIDGWAY & SON

COATESVILLE, PA.

DIRECTORY OF LEADING PIG IRON DEALERS

HUGH W. ADAMS & CO.

Pig Iron Merchants

15 Beekman Street, NEW YORK

Boston Office, 85 Water Street

CLINTON IRON & STEEL CO.

Manufacturers of the

CELEBRATED "CLINTON" SOFTENER

PITTSBURG, PA

LEE CHAMBERLAIN & CO.,

PIG IRON.

Rooms 44, 45 and 46 Board of Trade,

COLUMBUS, OHIO

St. Louis Office, Laclede Building

F. A. COODRICH & CO.

Incorporated

PIG IRON, STEEL, COKE, ETC.

Detroit, Mich.

MILLER, WAGONER & BENTLEY

PIG IRON,

Steel, Ore, Coke and Cinder,

COLUMBUS, OHIO

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CINCINNATI, CHICAGO,

BUFFALO,

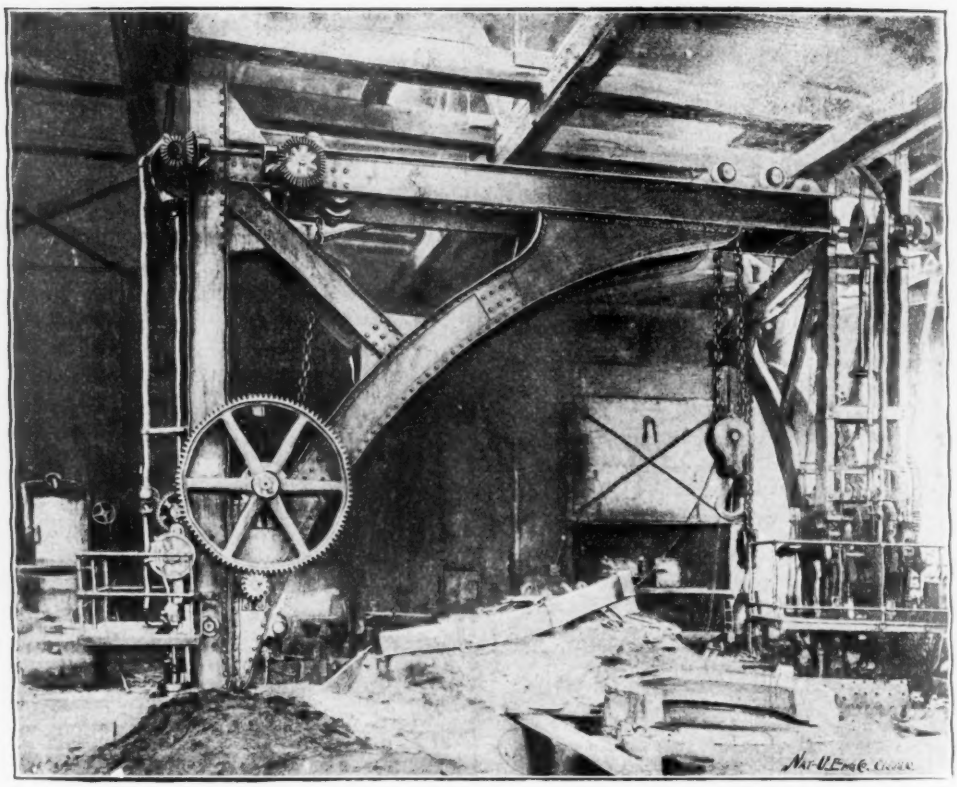
PHILADELPHIA, NEW YORK

ST. LOUIS

JOHN J. SHIPHERD, Pres. W. RUSSELL, Vice-Pres. and Mgr.
L. C. SHIPHERD, Sec'y and Treas.

THE

Phœnix Iron Works Co.



MANUFACTURERS

Hand, Steam, Belt, Hydraulic and Electric Cranes

FOR ALL PURPOSES.

Foundry Ladles, Chains, and General Machinery

WASON STREET.

CORRESPONDENCE SOLICITED.
WRITE FOR CATALOGUE.

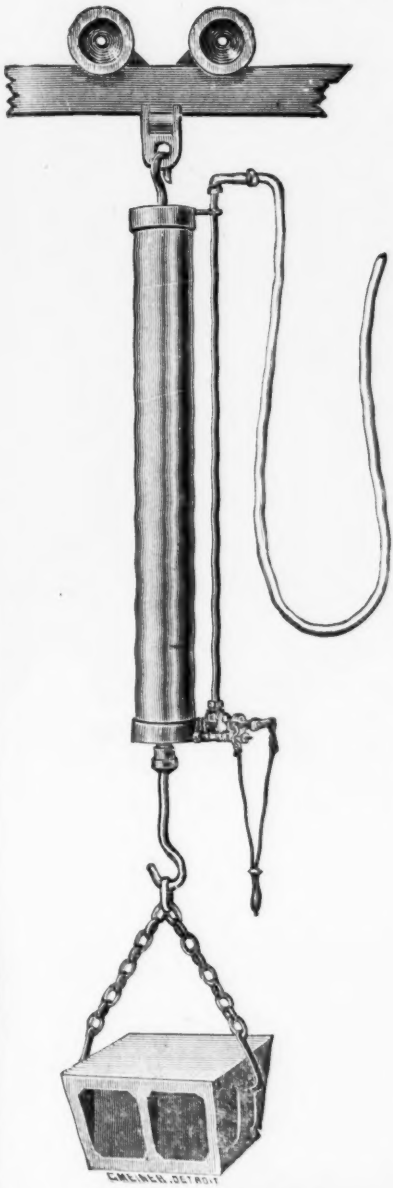
CLEVELAND, OHIO

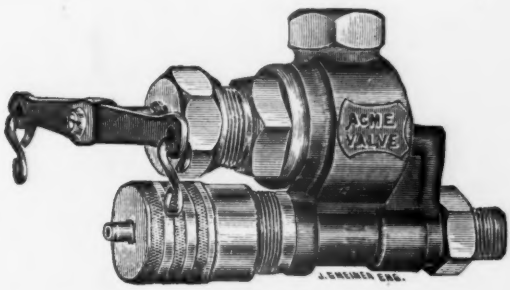
Eastern Office: HARRY W. JENNINGS, Agt., Fulton and Cliff Sts. NEW YORK, N. Y.
New England Office: THE JOHN WALES CO., 139 and 141 High St. BOSTON, MASS.

THE ACME HOIST Co

DETROIT, MICH.

Manufacture Pneumatic Hoists from . . 800 lbs. to 4 Tons Capacity. . .





The Acme Valve

Used on these Hoists is so constructed that when the ports admitting air to the hoisting cylinder are wide open, bodies of any weight, from the unloaded piston to the extreme capacity of the hoist, are raised at the

SAME RATE OF SPEED

throughout; furthermore this rate of speed can be quickly

Regulated to be Slow or Fast

as desired. Send inquiries to

THE

Acme Hoist Co.

69 Maybury Ave. DETROIT, MICH.

The Edw. P. Allis Co.

Milwaukee, Wis. have the largest foundry (exclusively for machinery castings,) in the United States. Its interior is shown by the following cut. . . . .

The daily melt is from 60 to 90 tons. All the heavy work is done under and handled by **THREE** thirty ton

Shaw Electric Traveling Cranes,

The first of which was put in operation in 1889, the second in 1891 and the third in 1893. Besides these, there are three more Shaw Cranes in the erecting and machine shops.

These Crane are Made Only by

THE SHAW ELECTRIC CRANE CO.

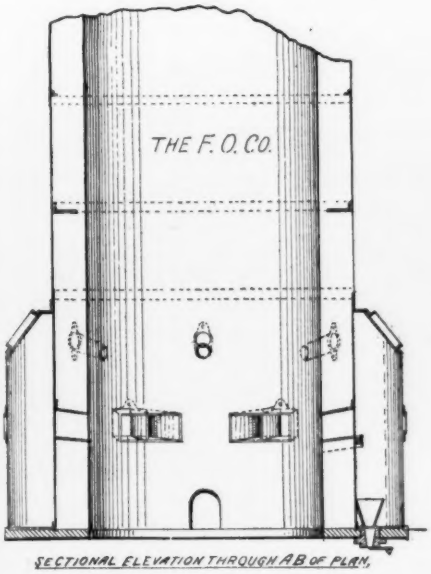
MUSKEGON, MICH.

——And Sold Only by——

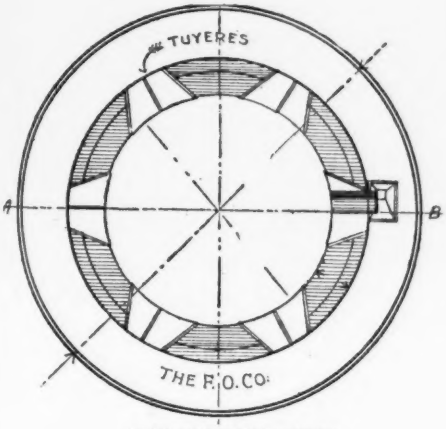
Manning, Maxwell & Moore,

424 TELEPHONE BUILDING, PITTSBURG.

60 S. CANAL ST., CHICAGO, ILL. **111 LIBERTY ST., NEW YORK.**



SECTIONAL ELEVATION THROUGH A B OF PLAN.



PLAN THROUGH TUYERES.

INVESTIGATE THIS . . . . .

Cupola

BEFORE BUYING ELSEWHERE

It will Pay

YOU

OUR LINE IS COMPLETE.

OUR PRICES ARE RIGHT.

GIVE US A CHANCE TO QUOTE ON FULL EQUIPMENT OR ANY PART.

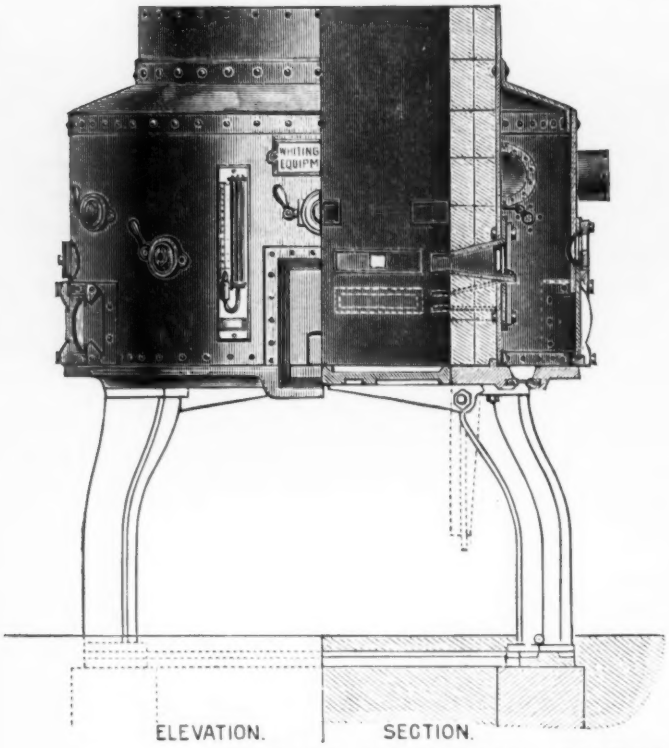
The Foundry Outfitting Co.,

WRITE FOR CIRCULAR.

DETROIT, MICH.

Whiting Foundry Equipment Company,

CHICAGO.



Fifteen Hundred Tons is the Aggregate Hourly Capacity in use

THE WHITING CUPOLA.

SEND FOR NEW CUPOLA CATALOGUE AND PRICES.

IF YOU

Really want to Save Money, here is one way to do it. Use our

Improved Air Hoists, and Compressed Air Cranes.

You can save the cost of the entire air plant in a few months. We would like to write you about it and send circulars.

Whiting Foundry Equipment Company,

1522 Monadnock Block, CHICAGO.

BUFFALO BLOWERS.
UNEQUALLED EFFICIENCY, DURABILITY, MINIMUM POWER.
BUFFALO FORGE CO. BUFFALO, N.Y. U.S.A.

BUFFALO FORGES.
AMERICAS BEST. THE WORLD'S STANDARD.
BUFFALO FORGE CO. BUFFALO, N.Y. U.S.A.

BUFFALO FAN SYSTEM OF HEATING AND VENTILATING
ALL LARGE BUILDINGS.
BUFFALO FORGE CO. BUFFALO, N.Y. U.S.A.

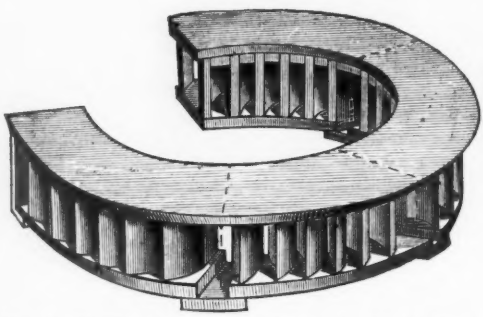
BUFFALO VENTILATING FANS
ELECTRIC, STEAM AND PULLEY TYPES. GREATEST AIR VOLUME, LEAST POWER
BUFFALO FORGE CO. BUFFALO, N.Y. U.S.A.

BUFFALO SHAVING EXHAUSTERS.
FOR HANDLING REFUSE IN ALL WOOD WORKING INDUSTRIES
BUFFALO FORGE CO. BUFFALO, N.Y. U.S.A.

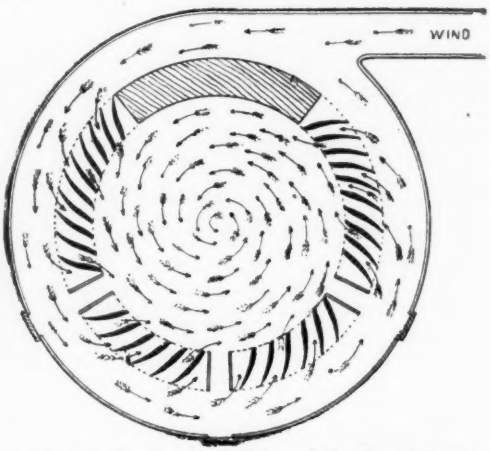
THE REASON WHY

Economy of fuel, rapid melting, the production a uniform grade and strength of iron is attained in the highest possible degree in the BLAKENEY CUPOLA FURNACE is comprehensively shown in the following cuts

Adopted by U. S. Navy Department.



The Combination of Sections of Tuyeres as placed in wall.



Showing direction of Wind through the Curved Tuyeres

Is not our method of introducing the blast into a cupola through **CURVED** tuyeres **MUCH** better than by the combination of upper and lower tuyeres, a series of pipes, or the old fashioned tuyeres? It will pay you to give this matter a little thought if you want the best results obtainable in a cupola. Illustrated catalogue No. 1 tells all about it. Let us send you one.

The Springfield Cupola Co.

SPRINGFIELD, - - - OHIO.

SAFETY TRAVELING CRANE.

Especially well adapted for Foundry use or wherever careful handling of loads is required. Thus copes and moulds can be lifted and transported with absolute safety. There is no jumping of chains; no jarring of load; no loss of sand; no breaking down of mould.

Will Hold the Load at any Point.

The chains wind on a drum, having right and left spiral threads. The hand chain wheel is removed from the line of the load by means of extended shaft, a fact which is of great advantage to the operator. The crane is supplied with roller bearings and travels with an easy steady movement. It is equally well adapted for heavy or light loads.

Let us give you an estimate. State required span and capacity.

LATHES, DRILLS, PLANERS, GEAR CUTTING, DOUBLE CHAIN SCREW HOISTS.

Edwin Harrington, Son & Co.

INCORPORATED.

1521 Pennsylvania Ave. - PHILADELPHIA, PA

"Columbus" Steel Tubular Wheelbarrow.

Made throughout of the best quality of high grade steel. Tray stamped without joint, seam or rivet, with edg bound over steel rod. Handles, Legs and Wheels the strongest put upon Tubular Barrows.

Made in nine different sizes. Largest manufacturers in the United States of TUBULAR BARROWS, STEEL CHARGING BARROWS and WOODEN BARROWS of every variety. Write for catalogue to

The Kilbourne & Jacobs Manufacturing Co.

LINCOLN STREET, COLUMBUS, OHIO.

The Woodruff Patent Separating Machine

Saves all shot and scale iron from foundry refuse. Used, appreciated and commended by Leading Founders in all parts of the country. . .

THE AUDUBON MACHINE WORKS,

NEW HAVEN, CONN.

BUILDERS OF SPECIAL MACHINERY

BUYERS' DIRECTORY.

ALUMINUM.
Cowles Electric Smelting and Aluminum Co.

AIR HOISTS.
Acme Hoist Co. Detroit, Mich.
Whiting Foundry Equipment Co.

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Kilbourne & Jacobs Mfg. Co., Columbus, Ohio.

BLOWERS.
Buffalo Forge Co., Buffalo. N. Y.
Connersville Blower Co., Connersville, Ind.
Root Blower Company, Connersville, Ind.
Sturtevant Company, The B. F., Boston, Mass.
Wilbraham Baker Blower Co., Philadelphia, Pa.

BRONZES.
Cowles Electric Smelting and Aluminum Co., Lockport, N. Y.

BRUSHES.
Rice Mfg. Co., New Durham, N. H.
Brand, S. H. & Co., Chicago, Ills.

COKE.
Brown & Cochran, 7 Wood St., Pittsburg, Pa.
Stevens, F. B., Detroit, Mich.

CORE COMPOUNDS.
Stewart, W. H.

CORE OVENS.
Millett Core Oven Co., Brightwood, Mass.

CORE OVEN CARS.
Kilbourne & Jacobs Mfg. Co., Columbus, Ohio.

CRANES.
Craig Ridgeway & Sons, Coatesville, Pa.
Harrington, E., Sons & Co., Philadelphia, Pa.
Phœnix Iron Works Co.
Shaw Electric Crane Co., Muskegon, Mich.
Whiting Foundry Equipment Co., Chicago.

CRUCIBLES.
Joseph Dixon Crucible Co., Jersey City, N.J.
McCullough, Dalzell & Co, Pittsburg, Pa.
Taylor Crucible Co., Philadelphia, Pa.

CUPOLAS.
Foundry Outfitting Co., The, Detroit.
Springfield Cupola Co., Springfield, Ohio.
Whiting Foundry Equipment Co., Chicago.

FIRE-BRICK.
Ayers, E. M., Zanesville, O.
Garden City Sand Co., Chicago, Ill.
Obermayer Company, The S., Cincinnati, Ohio
Ohio Sand and Clay Company, Columbus, Ohio
Paxson, J. W., & Co., Philadelphia, Pa.
Smith Foundry Supply Company, The J. D., Cincinnati, Ohio.
Stevens, F. B., Detroit, Mich.
Whitehead Bros. Co. New York.

FOUNDRY LADLES.
Foundry Outfitting Co., The, Detroit.
Obermayer Company, The S., Cincinnati, Ohio.
Paxson & Co., J. W., Philadelphia, Pa.
Phœnix Iron Works Co.
Stevens, F. B., Detroit, Mich.
Smith Foundry Supply Company, The J. D., Cincinnati, Ohio.
Whitehead Bros. Co. New York.
Whiting Foundry Equipment Co., Chicago.

FOUNDRY PLANS.
Foundry Outfitting Co., The, Detroit, Mich.
Whiting Foundry Equipment Co.

FOUNDRY SUPPLIES.
Cleveland Facing Mill, Cleveland, Ohio
Foundry Outfitting Co., The, Detroit.
Joseph Dixon Crucible Co. Jersey City, N. J.
Garden City Sand Co., Chicago, Ill.
Obermayer Company, The S., Cincinnati, Ohio
Paxson & Co., J. W., Philadelphia, Pa.
Stevens, F. B., Detroit, Mich.
Smith & Co., J. D., Cincinnati, O.
Whitehead Bros. Co. New York.

IRON BUILDINGS.
Berlin Iron Bridge Company, East Berlin, Conn
Wrought Iron Bridge Company, Canton, Ohio.

JAPANS.
Cleveland Varnish Co., Cleveland, O.

MANGANESE AND SILICON.
Cowles Electric Smelting and Aluminum Co.

MOLDING MACHINES.
Tabor Mfg. Company, 113 Liberty st., New York

MOLDING SAND.
Ayers, E. M., Zanesville, O.
Foundry Outfitting Co., The, Detroit.
Garden City Sand Co., Chicago, Ill.
Paxson & Co., J. W., Philadelphia, Pa.
Stevens, F. B., Detroit, Mich.
Whitehead Bros., 515-7 West 15th st., New York.

MOLDER'S TOOLS.
Burr's Damascus Works.

PATTERN FILLETS.
Canton Fillet Co. Canton, Ohio.
White, Howard, Philadelphia, Pa.

PATTERN MAKERS.
The Gobeille Pattern Co., Cleveland, Ohio.
Smith Pattern Works, Akron, Ohio.

PATTERN MAKERS SUPPLIES.
Milwaukee Foundry Supply Co, Milwaukee, Wis.

PATTERN TRIMMERS.
Fox Machine Co, Grand Rapids, Mich.

RAILROADS.
Big Four.
C. B. & Q. R. R.
Cincinnati, Hamilton, & Dayton, R.R., Cincinnati, O.
Queen and Crescent.

SEPARATING MACHINES.
Audubon Machine Co., New Haven, Conn.

SNAP FLASKS.
Adjustable Snap Flask Co., Liberty, Ind.

SPRUE CUTTERS.
Gould & Eberhardt, Newark, N. J

TUMBLING BARRELS.
Paxson & Co., J. W., Philadelphia, Pa.
Stover Mfg. Co., Freeport, Ills.
Whiting Foundry Equipment Co., Chicago

VARNISHES.
Cleveland Varnish Co., Cleveland, O.

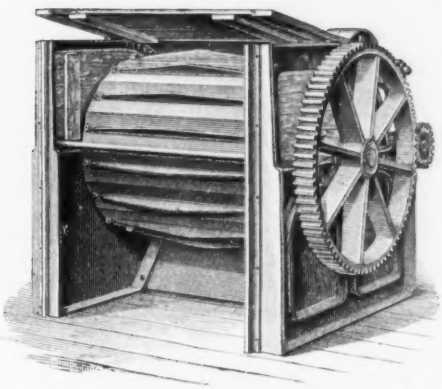
VENTILATOR IRONS.
Devlin, Thos. & Co. Philadelphia, Pa.

Brown & Sharpe Mfg. Co.,

FOUNDRY RATTLERS

DIAMETER.

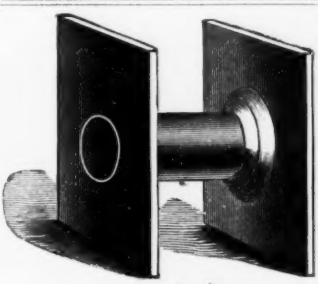
No. 1—23½ inch
No. 2—31½ inch
No. 3—31½ inch



LENGTH.

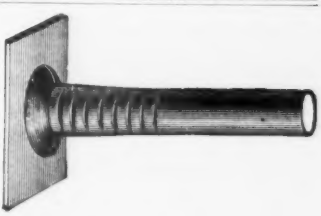
No. 1—26 inch
No. 2—31½ inch
No. 3—52 inch

PROVIDENCE, R. I.



Do Not be Alarmed

We are still in the RING and here to STAY. . .



SEND US YOUR ORDERS

And We will Guarantee the Goods and Prices.

Cleveland Chaplet & Man'g Co.

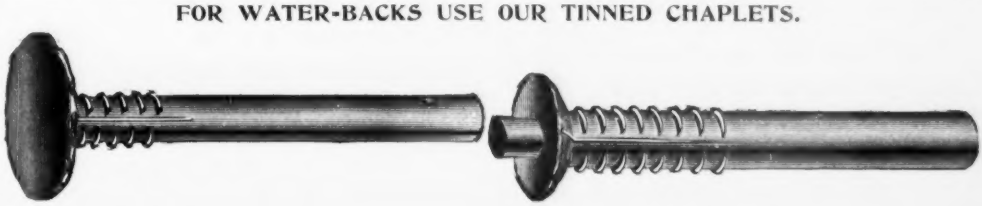
CLEVELAND, O.

MANUFACTURERS OF

CHAPLETS AND CHAPLET STEMS,

Stove Rods, Scrapers, Pokers, Towel Rods, and Nickel Plated Stove Trimmings

FOR WATER-BACKS USE OUR TINNED CHAPLETS.



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THE FOUNDRY

The only foundry paper published in the world, and an authority on all matters pertaining to the foundry business.

RATES OF SUBSCRIPTION.

Single subscription to all parts of the United States and Canada, $1 per annum.
" " Universal Postal Union, 1.50 "
Eight or more subscriptions at one time, 75 cents each.

ADVERTISING RATES.

One page	per month,	$20.00
Half page	"	12.00
Quarter page	"	7.00

When space is specified an extra charge of five per cent. on the above figures will be made. All pages between front cover and reading matter reserved for whole page advertisements.

Advertisers in THE FOUNDRY have the privilege of discontinuing their advertisements at any time after they have had three insertions, and will only be charged pro rata for the number of insertions printed. They also have the privilege of changing advertisements as often as desired.

The publishers of THE FOUNDRY appreciate the fact that it is customary for publications, especially the class known as Trade Journals, to quote a rate for advertising from which greater or less discounts are given, according to the persistency of the advertiser. This system is manifestly unfair as tending to show partiality. We have deducted the usual discount before quoting rates, thus giving it to all alike, and no reduction of any sort on the above rates can be made.

Copy for advertisements should be in by the 25th of the month preceding publication.

A REVOLUTION

In Pattern Making was the result of the introduction of the

FOX UNIVERSAL TRIMMER

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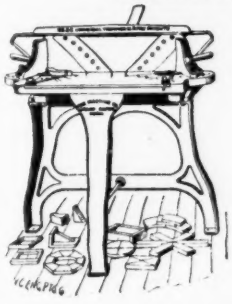

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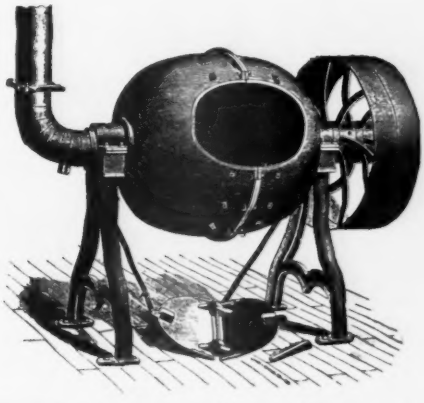

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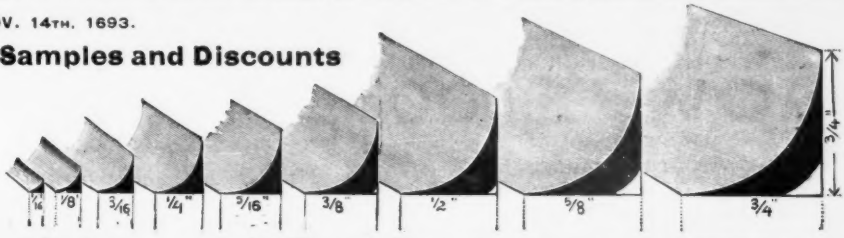

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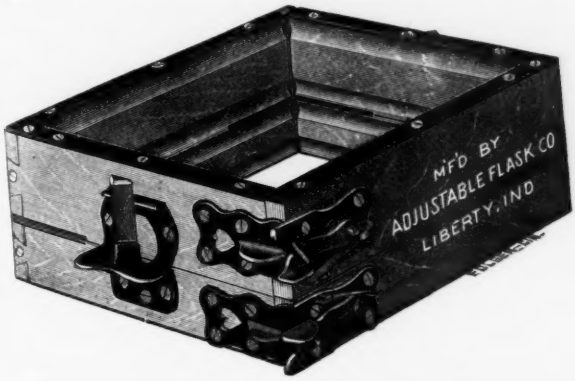

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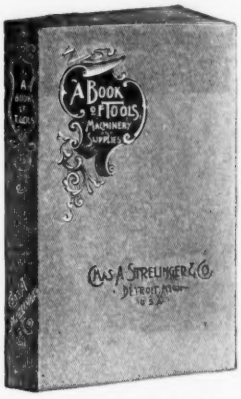

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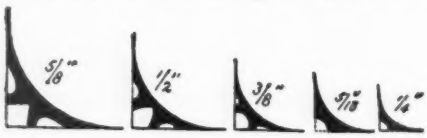

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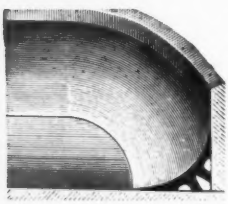

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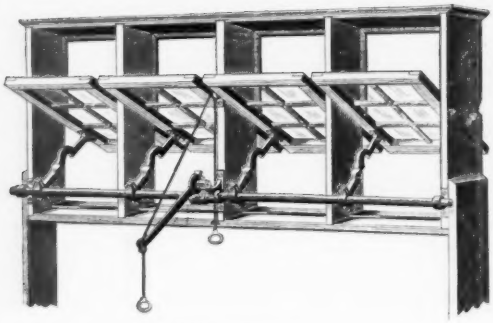

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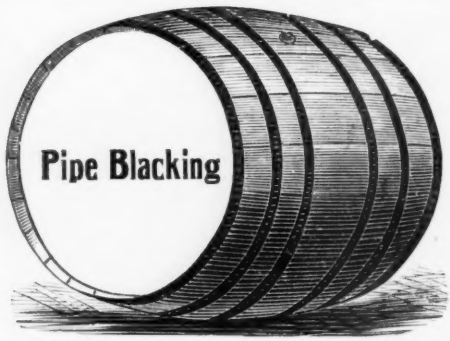

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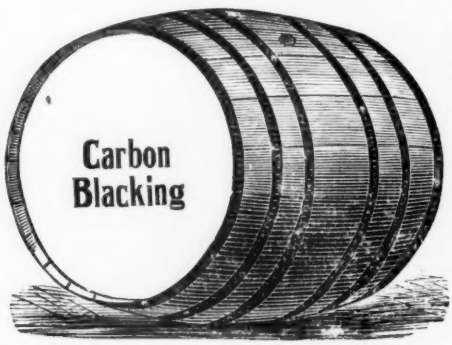

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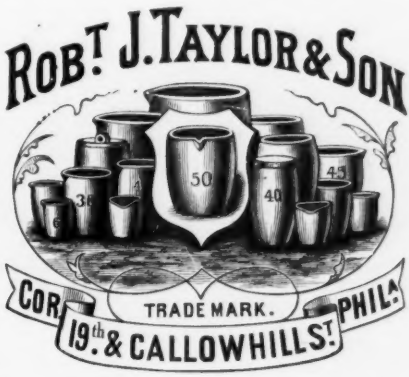

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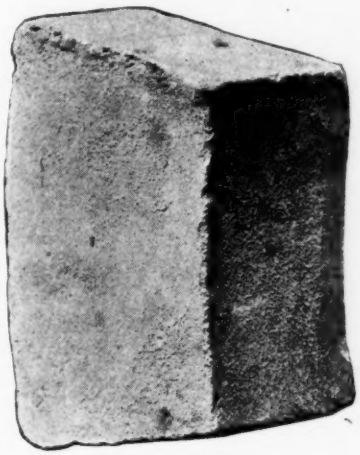

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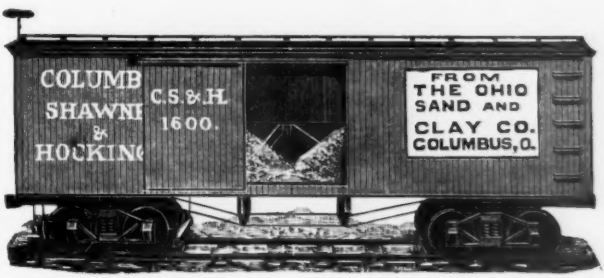

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The Ohio Sand and Clay Co.

THE FOUNDRY. COLUMBUS, O.

You are making a mistake

IF YOU ARE NOT BUYING YOUR
MOLDING SAND AND FIRE CLAY OF

E. M. AYERS

TWELVE YEARS' EXPERIENCE

In Mining and Shipping SAND and CLAY, enables us to ship you just what you need. We can send you any grade of MOLDING SAND you may require, from the finest to the coarsest, and guarantee quality always the same. Order our No. 0 Sand for Brass Castings; our No. 1 for Light Work; our No. 2 for Medium Heavy Stove Plate; our No. 3 for Medium Weight Castings, Light Machinery and Car Wheels; Our No. 4 is the best sand in use for Heavy Castings of any kind. It is an extra good wearer and is always sure to turn out a perfect casting.

Ask for
SAMPLES and PRICES.

MOLDING SAND
FIRE SAND
CORE SAND
CRUSHED ROCK AND
FIRE CLAY

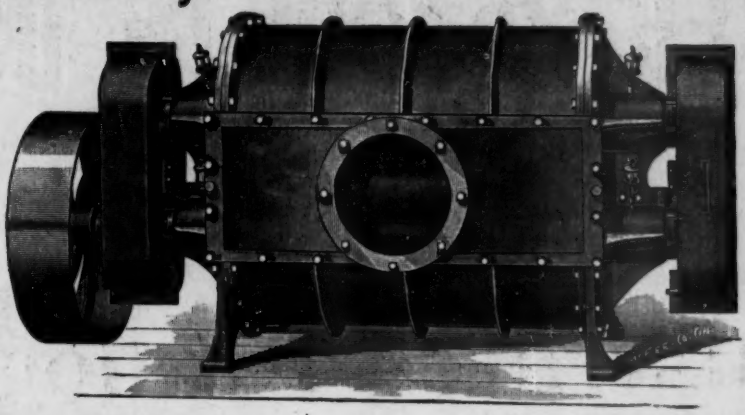
MOST PROMPT ATTENTION TO CORRESPONDENCE AND SHIPMENTS.
GIVE US A TRIAL ORDER AND WE WILL PLEASE YOU.

E. M. AYERS

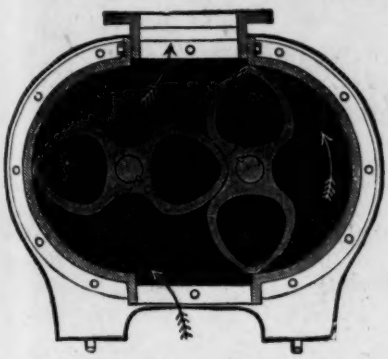
108 MAIN STREET, ZANESVILLE, O.

Roots' Rotary Positive Pressure Blowers.

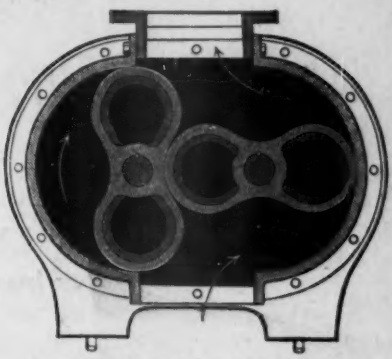
Latest Improved Blower.



Result of 35 Years Experience.



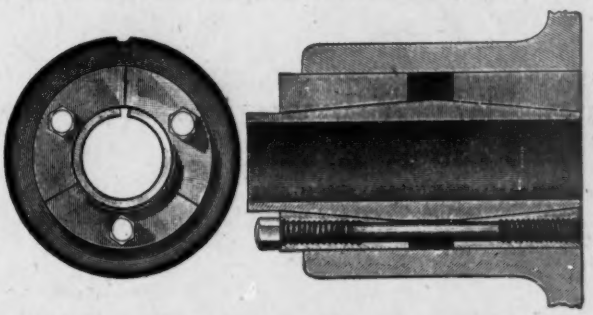
ROOTS' STANDARD BLOWER.



ROOTS' TRUE CIRCLE BLOWER.

Only Blower on the Market with Sectional Adjustable Journal Box.

Positively Adjustable.



Shafts Always in Alignment.

The Roots Blower Saves Horse-Power, Shortens Length of Heat, Economizes Fuel and Makes a Fluid Iron.

P. H. & F. M. Roots Co.,

Connersville, Indiana.

OVER 25,000 IN USE.

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Illustrated Catalogue

also Testimonial Sheet,

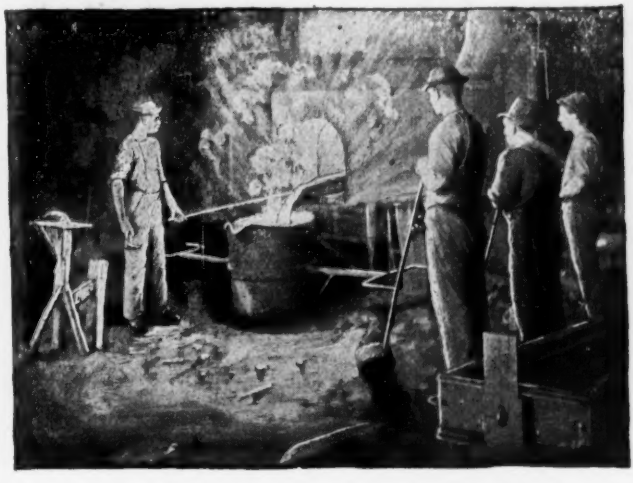
Containing Testimonials from Leading Manufacturers who have been using

Roots' Positive Pressure Blowers

from Ten to Twenty-Five Years Continuously.

P. H. & F. M. Roots Co.,

Connersville, Indiana.



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THAT WILL TURN OUT SMOOTH AND PERFECT

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Heavy Machinery Castings
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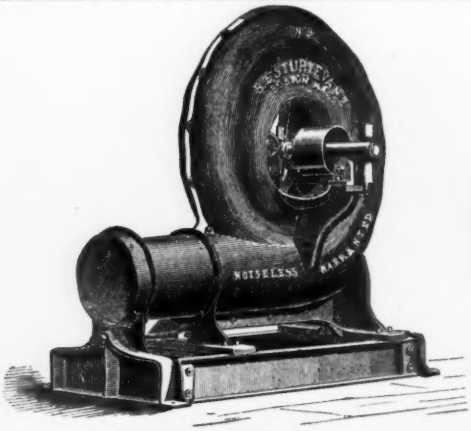
216 MAIN STREET, ZANESVILLE, O.



Blower on Adjustable Bed.

THE STURTEVANT STEEL Pressure Blowers,

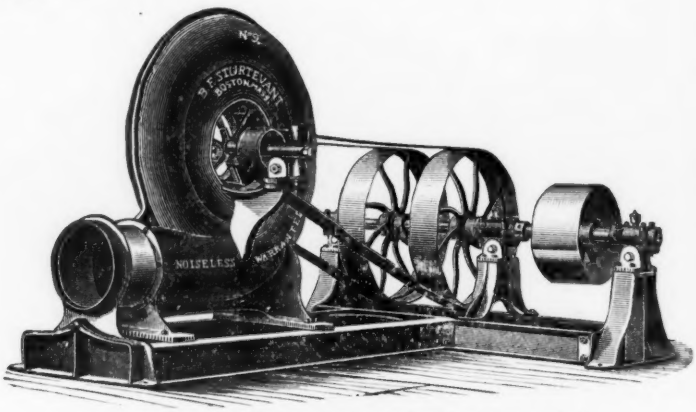
—FOR—

Cupola Furnaces and Forge Fires.

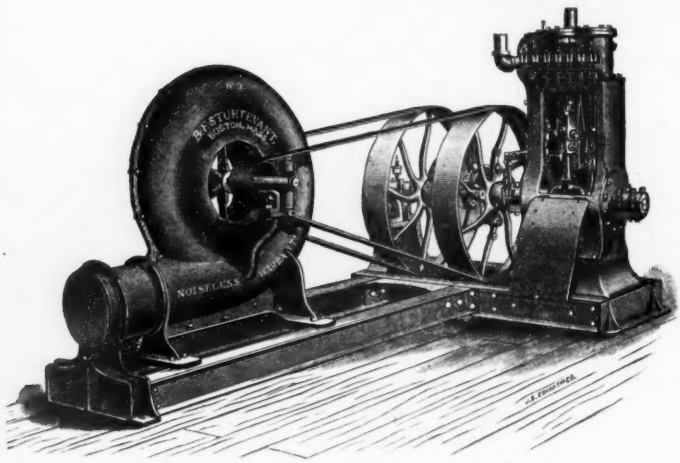
BLOWERS

Furnished without Bed with Separate Countershaft

BLAST GATES



Blower on Adjustable Bed with Combined Countershaft.



Blower on Adjustable Bed with Double Enclosed Engine.

BLOWERS

WITH

THE STURTEVANT

Direct Connected

Electric Motors

Send for Catalogue.

B. F. STURTEVANT CO.,

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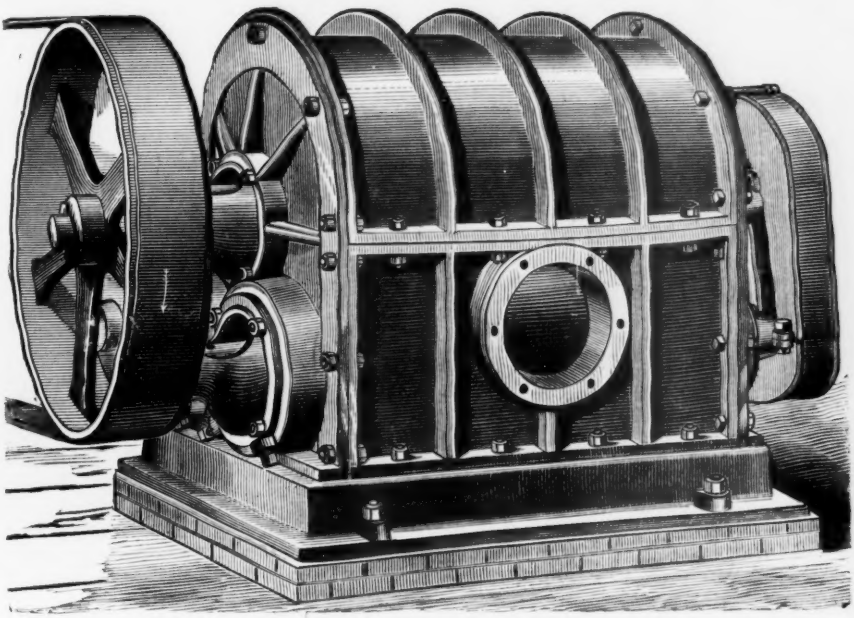
STOCK CARRIED AT BRANCHES.

The Baker Rotary Pressure Blower

ONLY ONE BELT IS REQUIRED TO DRIVE THE LARGEST BLOWER.



The Best POSITIVE PRESSURE BLOWER for IRON FOUNDRY CUPOLAS, Pneumatic Tubes, Water Gas Works, Smelting Silver, Lead, or Copper Ores, Sand Blast, Forge or Knobling Fires, Ventilating Mines or Tunnels, or any other purpose requiring a POSITIVE BLAST OR EXHAUST.

Wilbraham Baker Blower Co.,

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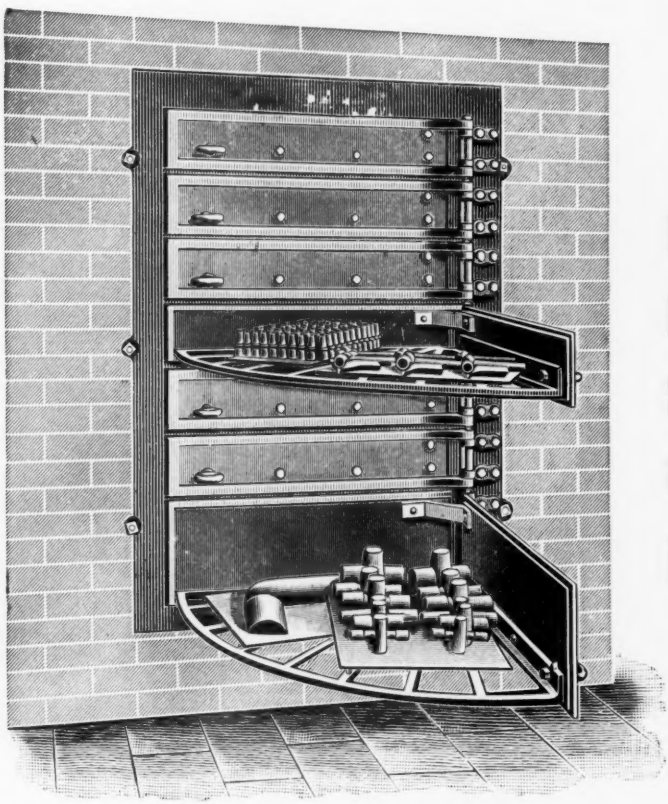
Millett's Patent Core Oven

—With—

Double Doors, one at the back of shelf closing the oven when wide open.

Patented July 19, 1887.

Saves Fuel
Saves Expense
Saves Time
Does more work
Makes Better
CORES.



If you Make Small Cores you Need it

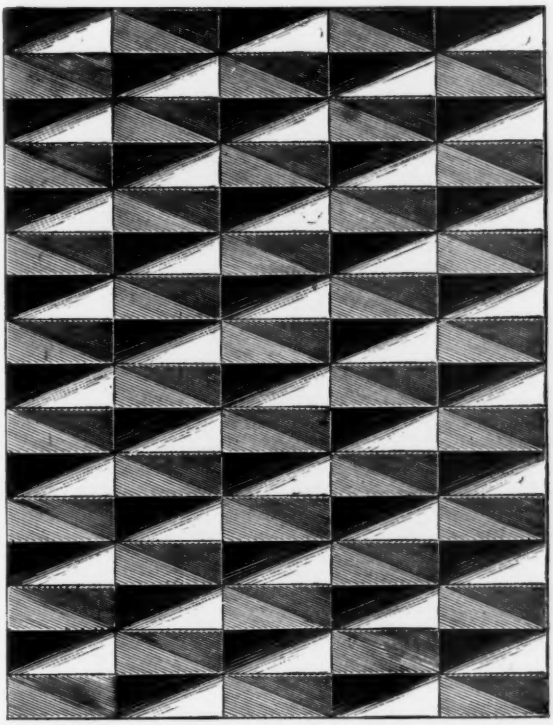
One Hundred in use and every one gives satisfaction.

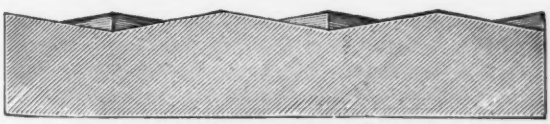
Write us for circulars and prices.

Millett Core Oven Co.,

Brightwood, Mass.

FOR SALE BY J. W. PAXSON & CO., PHILADELPHIA, PA.





The above cut shows exact size of Diamonds.

Diamond Pattern Lumber,

—FOR—

DOOR SILLS, PLATFORMS, STEP PLATES, Etc.

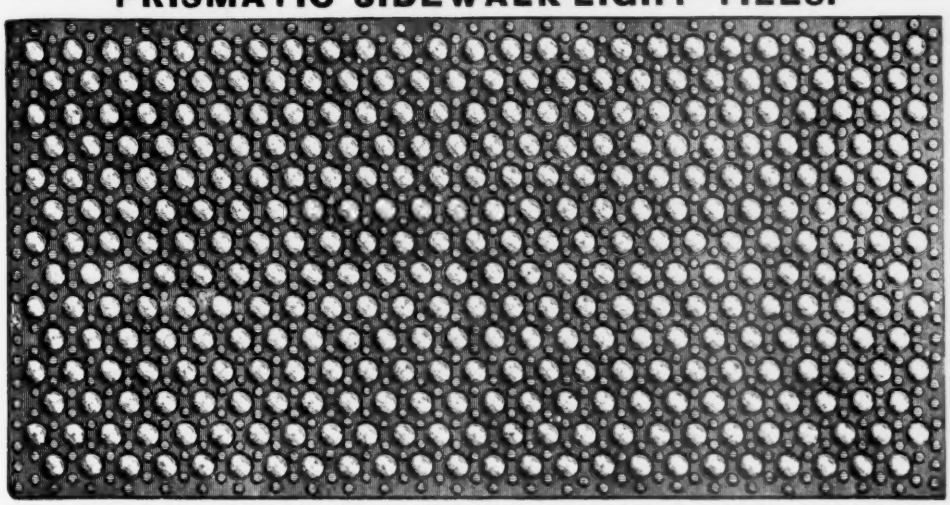
This Patent Lumber is made by a Special Machine invented by us, the ONLY Machine of its kind, and each piece will match PERFECTLY with all other pieces, by "joining" the edges to the centre, lengthwise, or any row of Diamonds.

Size of each piece, 8 feet long by 6 inches wide, and ½ inch thick. Price 10 cents per running foot of 6 inches in width, NET CASH crated and delivered f. o. b. Chicago, in orders of not less than 6 pieces. Send for sample.

BROWN BROS. MFG. CO.

Cor. Clinton and Jackson Sts. Chicago.

PRISMATIC SIDEWALK LIGHT TILES.



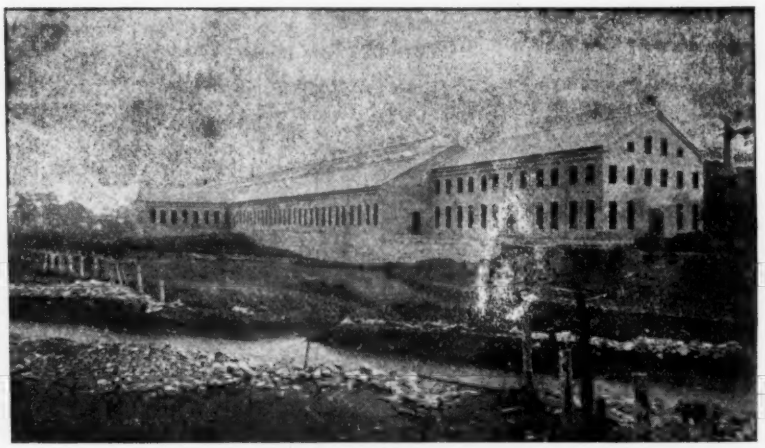
Make your own frames and we will furnish you with Tiles for either Iron or Concrete Lights. Write for prices.

BROWN BROS. MFG. CO.,

Mention THE FOUNDRY. Cor. Jackson and Clinton Sts. CHICAGO.

Wrought Iron Bridge Co.,

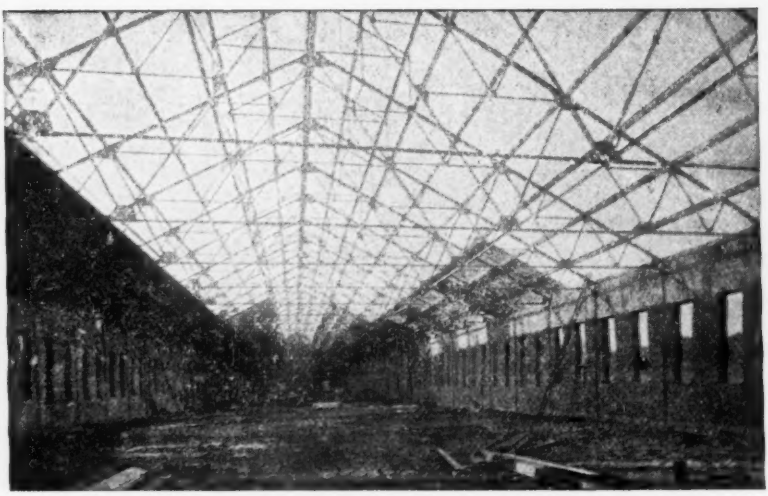
DESIGNERS AND BUILDERS IN
IRON AND STEEL
FIRE PROOF BUILDINGS



FOR
FOUNDRIES, MACHINE SHOPS
ETC., ETC.

Exterior of Foundry of Warder, Bushnell & Glessner Co., Springfield, Ohio.

Traveling and Jib Cranes for handling
Heavy Castings and Machinery.



Buildings Designed for Special
Requirements.

Interior Foundry Building of Warder, Bushnell & Glessner Co., Springfield, Ohio.

The roof of this building was erected by the Wrought Iron Bridge Co., Canton, Ohio, and consists of steel trusses supporting wooden purlins to which matched and dressed sheeting is nailed for slating. Trusses being 18 ft. above the floor, the wood work of roof is out of danger from fire, while the cover being of slate a suitable cornice to protect the overhanging of roof from flying sparks, or heat from the burning of neighboring buildings, renders this structure absolutely fire proof. Windows are set in the sides of ventilator throughout its entire length, so that ample light and ventilation is insured.

Wrought Iron Bridge Co.

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136 Liberty St., NEW YORK.

CHAS. M. JARVIS, President and Chief Engineer. BURR K. FIELD, Vice-President.
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THE BERLIN IRON BRIDGE CO.,

ENGINEERS, ARCHITECTS

—AND BUILDERS OF—

Iron and Steel Bridges, Roofs and Buildings.

The above illustration taken direct from a photograph, shows the interior of an iron foundry designed and built by us for The Farrel Foundry & Machine Co., at Ansonia, Conn. The building is 129 feet in width and 302 feet in length. The wings are 30 feet and 43 feet respectively, and the central portion is controlled by a hydraulic crane with a travel the full length of the building and is so arranged with jib cranes for delivering material from the traveling cranes to the wing trusses.

Office and Works, - - EAST BERLIN, CONN.

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ESTABLISHED 1875.

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BINGHAMTON, N. Y.

Inventors and Manufacturers of the

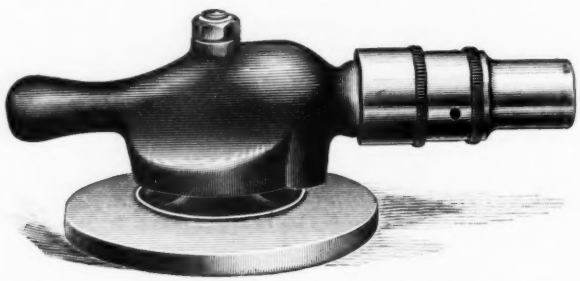
STOW FLEXIBLE SHAFT

FOR ALL PURPOSES.

Emery Grinding,
Wood Boring,
Drilling, Tapping,
Reaming, Etc.

PORTABLE EMERY GRINDER.

For no tool we manufacture has there been so rapidly increasing demand as for our **Portable Emery Grinder.** It is giving perfect satisfaction to hundreds of our customers. For cleaning and grinding heavy castings, for buffing and polishing all metals and glass it is almost indispensible, and a great time and labor saver. The above cut shows the tool running emery wheel on edge—below we illustrate our appliance which is to be substituted for the clamp spindle when grinding, shaping and polishing flat surfaces.



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STOW M'F'G. CO., Binghamton, N. Y.

P. G. COCHRAN, Pres. JOHN H. WURTZ, Secretary
J. R. LAUGHREY, Treas. J. S. NEWMYER, Mgr.

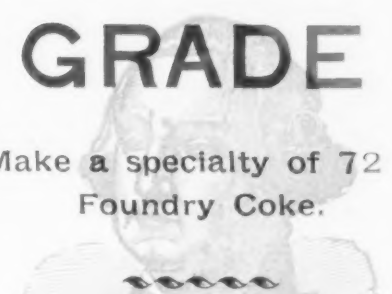
Washington Coal & Coke Co

(CAPITAL PAID-UP $250,000.)

MANUFACTURERS OF

HIGH GRADE COKE

We Make a specialty of 72 Hour Foundry Coke.



ANALYSIS:

Vol. Matter,	1.13
Carbon,	88.21
Ash,	10.66
Sulphus,	.86
Phosphorus,	.017

These Few Lines tell the Story.

Try it. It is from a newly developed coal adjacent to the heart of the Connellsville Coke Bed. Freight rate is 16 cents per ton less than Connellsville. Shipments to all points via P. & L. E., L. S. & M. S. and N. Y. L. E. & W. Rys. and connections, only.

Correspondence solicited.

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INGOTS, SHEETS, RODS, WIRE.

COWLES No. 1 ALUMINUM ALLOY.

Nearly as light as pure Aluminum, but considerably harder and stronger, also casts much better than pure Aluminum. A fine metal for patterns and models. Supplied in ingots.

FERRO ALUMINUM. . .

For use in iron and steel castings.

MANGANESE COPPER. . .

A rich alloy of Manganese and copper, from which any desired grade of Manganese Bronze can be made. Supplied in ingots.

ALUMINUM BRONZE. . .

Any grade, in ingots.

MANGANESE BRONZE. . .

For propellor wheels and other castings. Supplied in ingots.

SILICON COPPER. . .

A rich alloy of Silicon and Copper. The addition of from 1½ to 2 lbs. of this alloy to 100 lbs of copper will insure a SOLID COPPER CASTING. Supplied in ingots.

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Pig Iron Merchants

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CLINTON IRON & STEEL CO.

Manufacturers of the

CLINTON INSPECTED FOUNDRY IRON

CELEBRATED "CLINTON" SOFTENER

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PIG IRON.

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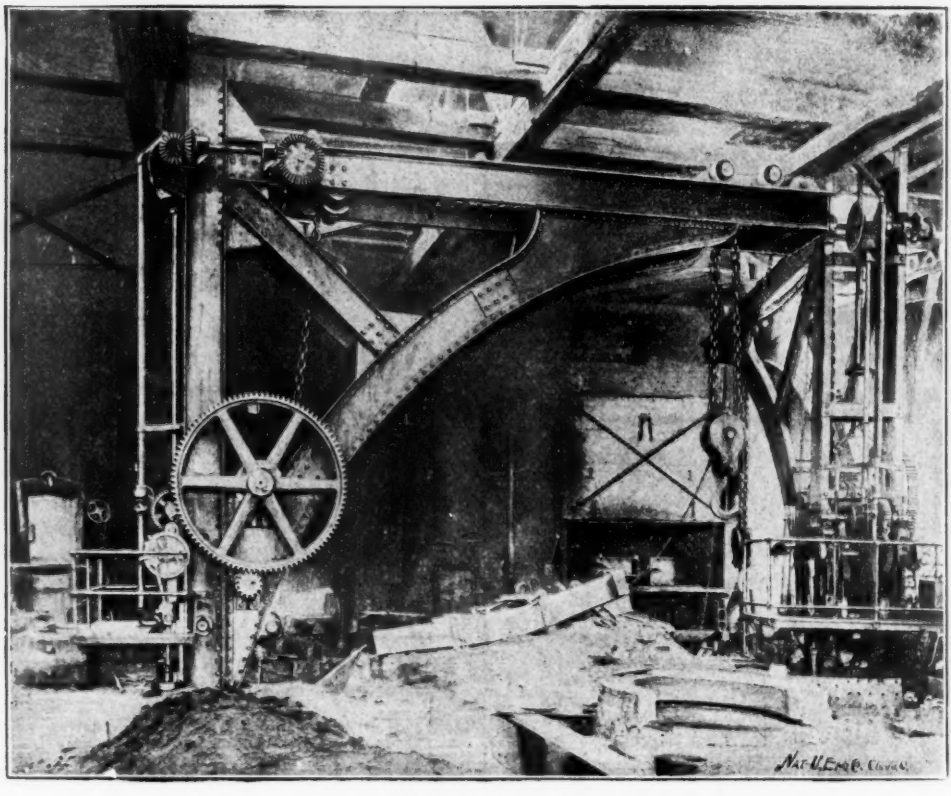
L. C. SHIPHERD, Sec'y and Treas.

THE

Phœnix Iron Works Co.



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Hand, Steam, Belt, Hydraulic and Electric Cranes

FOR ALL PURPOSES.

Foundry Ladles, Chains, and General Machinery

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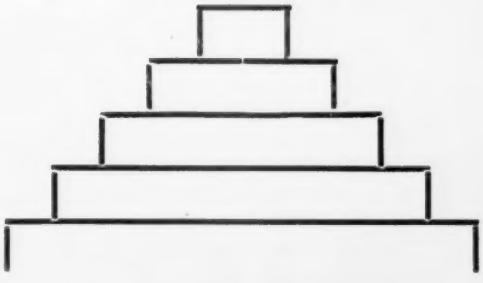
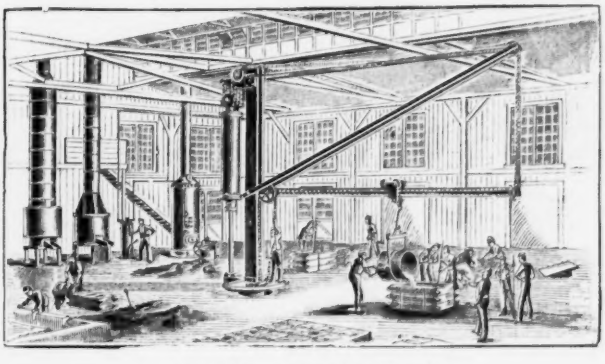
We have a Big Pile of Letters, So High!





5-ton Ridgway Crane in a Foundry.

FROM

The heads of the greatest concerns in this country, praising this crane in stronger terms than any we use. When people send for us to come and talk crane to them and we get them started reading these letters in the original they soon cry "Ridgway, that's enough! Don't hand me any more, I'm satisfied with all you say when you have such endorsements as these. What's your very lowest, hard times, "inch bone" price for a crane such and such size, etc." And we go home with the order and in a few months another glowing letter is added to our Big Pile and we have made another warm and enthusiastic friend.

When you can put a machine in a man's shop that increases his profits, somehow or other his heart goes right out to you. Always glad to see you, always glad to speak a good word for you, always your good friend if you have any good qualities that deserve it. All foundrymen are our friends because

The Same Moulders do 50 per cent. more work with the same Wages with this crane than any other, and do it better and easier

Why can't we make a good friend of you in the same delightful way?

CIRCULAR FOR THE ASKING.

Don't be afraid to write. We won't drum you. Don't have to coax people to buy these machines. If you only know about it the machine does the rest.

Craig Ridgway & Son,

COATESVILLE, PA.

The Edw. P. Allis Co.

Milwaukee, Wis. have the largest foundry (exclusively for machinery castings,) in the United States. Its interior is shown by the following cut.

The daily melt is from 60 to 90 tons. All the heavy work is done under and handled by **THREE** thirty ton

Shaw Electric Traveling Cranes,

The first of which was put in operation in 1889, the second in 1891 and the third in 1893. Besides these, there are three more Shaw Cranes in the erecting and machine shops.

These Crane are Made Only by

THE SHAW ELECTRIC CRANE CO.

MUSKEGON, MICH.

——And Sold Only by——

Manning, Maxwell & Moore,

424 TELEPHONE BUILDING, PITTSBURG.

60 S. CANAL ST., CHICAGO, ILL. **111 LIBERTY ST., NEW YORK.**

Cupola Furnaces
Blowers
Cranes
Hoists
Elevators
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Core Oven Cars
Wheel Barrows
Ladles
Reservoirs
Tumbling Mills
Tumbling Barrels
Core Ovens
Sand Sifters
Brass Furnaces
Barrows
Testing Machines
Trolley Tracks
Foundry Lights
Flasks
Separating Machines
Fire Brick
Fire Clay
Molding Sand

DO YOU WANT ANY= THING?

?

We make it our business to furnish only the

BEST

If you want an inferior article go elsewhere.

An experience of 21 years in the Foundry business and 9 years in this, enables us to intelligently figure on your wants, and if we please you and get your confidence and first orders, we will have you as permanent customers. That is what we are after.

"Everything Used in a Foundry."

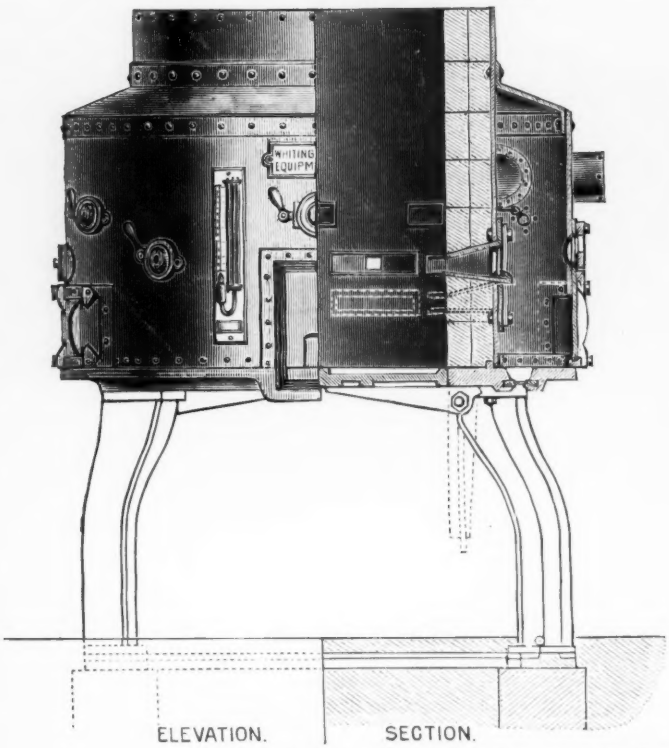
WRITE US,

The Foundry Outfitting Co.

DETROIT, MICH.

Whiting Foundry Equipment Company,

CHICAGO.



Fifteen Hundred Tons is the Aggregate Hourly Capacity in use

THE WHITING CUPOLA.

SEND FOR NEW CUPOLA CATALOGUE AND PRICES.

IF YOU

Really want to Save Money, here is one way to do it. Use our

Improved Air Hoists, and Compressed Air Cranes.

You can save the cost of the entire air plant in a few months. We would like to write you about it and send circulars.

Whiting Foundry Equipment Company,

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BUFFALO BLOWERS.
UNEQUALLED EFFICIENCY, DURABILITY, MINIMUM POWER.
BUFFALO FORGE CO. BUFFALO, N.Y. U.S.A.

BUFFALO FORGES.
AMERICAS BEST. THE WORLD'S STANDARD.
BUFFALO FORGE CO. BUFFALO, N.Y. U.S.A.

BUFFALO FAN SYSTEM OF HEATING AND VENTILATING
ALL LARGE BUILDINGS.
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BUFFALO VENTILATING FANS
ELECTRIC, STEAM AND PULLEY TYPES, GREATEST AIR VOLUME, LEAST POWER
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BUFFALO SHAVING EXHAUSTERS.
FOR HANDLING REFUSE IN ALL WOOD WORKING INDUSTRIES
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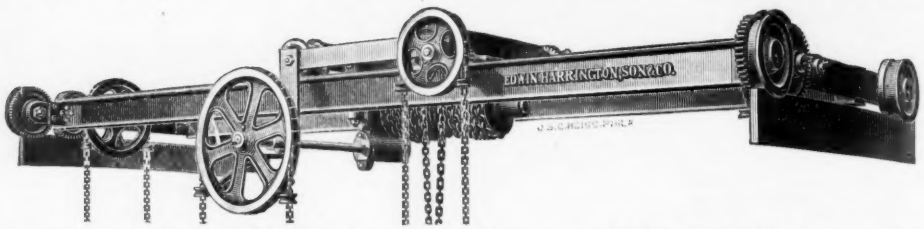
SAFETY TRAVELING CRANE.



Especially well adapted for Foundry use or wherever careful handling of loads is required. Thus copes and moulds can be lifted and transported with absolute safety. There is no jumping of chains; no jarring of load; no loss of sand; no breaking down of mould.

Will Hold the Load at any Point.

The chains wind on a drum, having right and left spiral threads. The hand chain wheel is removed from the line of the load by means of extended shaft, a fact which is of great advantage to the operator. The crane is supplied with roller bearings and travels with an easy steady movement. It is equally well adapted for heavy or light loads.

Let us give you an estimate. State required span and capacity.

LATHES, DRILLS, PLANERS, GEAR CUTTING, DOUBLE CHAIN SCREW HOISTS.

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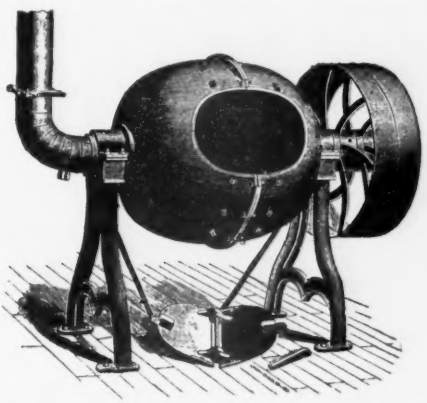

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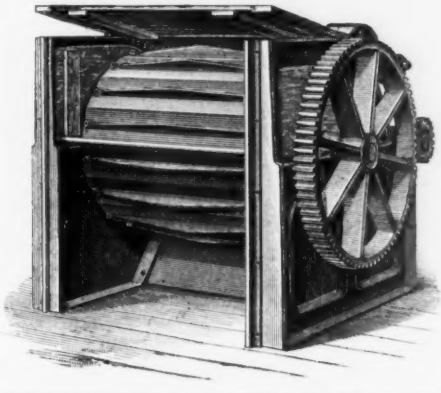

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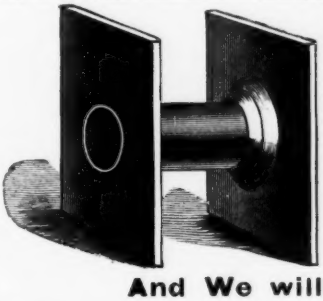

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We are still in the RING and here to STAY. . .

SEND US YOUR ORDERS

And We will Guarantee the Goods and Prices.

Cleveland Chaplet & Man'g Co.

CLEVELAND, O.

MANUFACTURERS OF

CHAPLETS AND CHAPLET STEMS

Stove Rods, Scrapers, Pokers, Towel Rods, and Nickel Plated Stove Trimmings

FOR WATER-BACKS USE OUR TINNED CHAPLETS.

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THE FOUNDRY

The only foundry paper published in the world, and an authority on all matters pertaining to the foundry business.

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Single subscription to all parts of the United States and Canada, $1 per annum.
" " Universal Postal Union, 1.50 "
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ADVERTISING RATES.

One page - -	per month, $20.00
Half page - - -	" 12.00
Quarter page - -	" 7.00

When space is specified an extra charge of five per cent. on the above figures will be made. All pages between front cover and reading matter reserved for whole page advertisements.

Advertisers in THE FOUNDRY have the privilege of discontinuing their advertisements at any time after they have had three insertions, and will only be charged pro rata for the number of insertions printed. They also have the privilege of changing advertisements as often as desired.

The publishers of THE FOUNDRY appreciate the fact that it is customary for publications, especially the class known as Trade Journals, to quote a rate for advertising from which greater or less discounts are given, according to the persistency of the advertiser. This system is manifestly unfair as tending to show partiality. We have deducted the usual discount before quoting rates, thus giving it to all alike, and no reduction of any sort on the above rates can be made.

Copy for advertisements should be in by the 25th of the month preceding publication.

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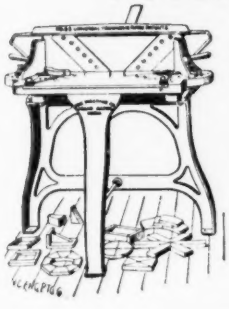
In Pattern Making was the result of the introduction of the

FOX UNIVERSAL TRIMMER

Our first machines were considered marvelous time and money savers, as they saved fully one quarter of the cost of patterns. Our latest machine, **STYLE E,** is a combination of utility and convenience such as our ten years of experience in this line has proved essential and desirable

ACCURATE! POWERFUL! CONVENIENT!



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Sent out on Trial anywhere in the U. S.

Latest Sprue Cutter..

UP-TO-DATE
DURABLE
STRONG
NEAT

Price Low

Send to

GOULD & EBERHARDT, NEWARK, N. J.

Black Baking Enamel

AND

AIR DRYING JAPAN

For Light Iron, Hardware, Etc

Shellac Varnishes

For Patterns.

—THE—

Cleveland Varnish Co.

Makers,

CLEVELAND, - OHIO

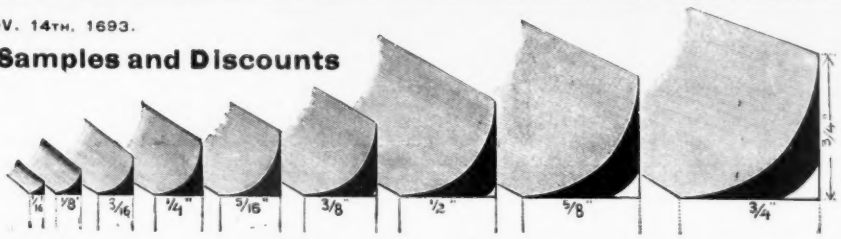
PATTERNS FOR CASTINGS.

ANYTHING, from a Toy Pistol to a Steel Plant.
Largest Pattern Works in the World.

The Gobeille Pattern Co., Cleveland, O.

PATENTED NOV. 14TH. 1693.

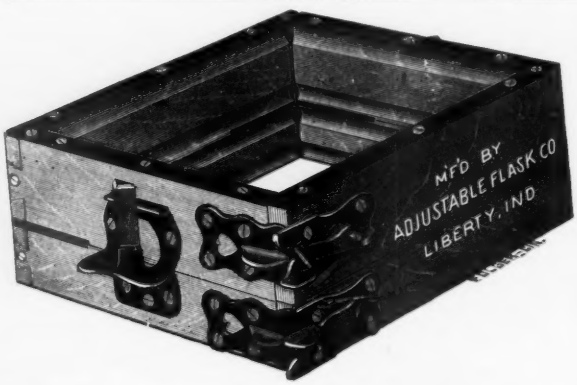
Write for Samples and Discounts



Pattern Makers and Founders

Should use none but the **BELDING PATENT LEATHER FILLET,** the only one made scientifically correct. Quickly applied to any corner, straight surface, single or compound curves, wood or iron, without nails or clamps. Once used, always used. Send sample order. **Proper Discounts will be Allowed You.**

THE CANTON FILLET CO. **Canton, Ohio.**



Snap Flasks . .

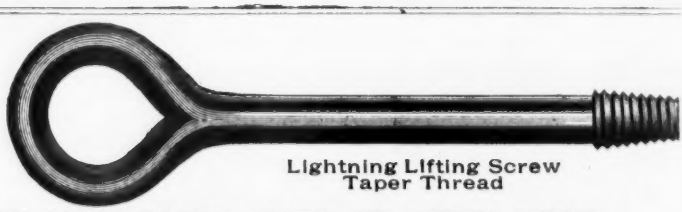
All styles and sizes. The cut shows our **Solid Taper Snap Flask** which are unusually light and strongly made of ¾ inch soft maple, well seasoned, fitted with our latest improved hinge and **Automatic Spring Latch.** Tapers ¼ inch to 1 foot, just enough to allow slip boxes to go over molds and fit snug

ADJUSTABLE SNAP FLASK Co

LIBERTY, IND.

SAVE

Your Patterns



Lightning Lifting Screw
Taper Thread

BY USING **FRASER'S PATENT RAPPING PLATES AND LIFTING SCREWS.**

Pattern Letters and Figures, Flask Clamps and Fittings, Leather Fillet Cutters, Universal Trimmers, Dowel Pins, Etc.

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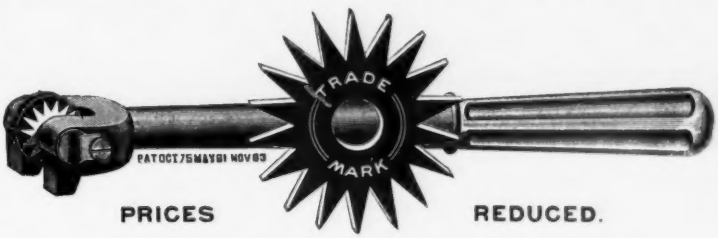
DO NOT BE DECEIVED—THERE IS ONLY ONE GENUINE HUNTINGTON.

An Extra 10 per cent WILL BE GIVEN ANY-ONE WHO MENTIONS "THE FOUNDRY."



PRICES REDUCED.

IN ORDERING ASK FOR THE FOUNDRY PATTERN.

EACH SET OF OUR CUTTERS IS PUT IN A PAPER BOX.

THE CHICAGO SCREW CO., CHICAGO.

Sole Manufacturers of Genuine Huntington Emery Wheel Dresser.

SEE THAT HINGE?

S. H. BRAND & CO.

Manufacturers
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Supplies

CHICAGO, - U. S. A.

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We are the only **Crucible** manufacturers in the west, hence most accessible to western manufacturers and dealers, the **Improvements** in the shape and **Durability** of our Crucibles within the last few years, makes them the most **Durable** of any in the market. **Give Us a Trial.** Also Silver Gloss Stove Polish, none better. We handle only **Ceylon or East India Plumbago,** the best in the world and at prices that can't be beat, for Lubricants, Facings, Paints, etc. Send for samples with quotations and we will give you satisfaction.

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Samples Free.

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Steel Shrink Rules.

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Improvement in Core Work

W. H. STEWART'S

FOUNDERS' Core Compound

Used by the Principal Foundries in the U. S.

Prepared ready for use in **LIQUID FORM** to be mixed with the regular core sand. The cores are **DAMP-PROOF** and do not absorb moisture. **SPUTTERING** and **BLOWING** by reason of damp cores are avoided. The cores are **HARDER, FIRMER** and **STRONGER** than can be made by any other process and cost less to make. They can be set at any time and **EASILY CLEANED FROM THE CASTING.** Send for our descriptive pamphlet with prices and directions for use.

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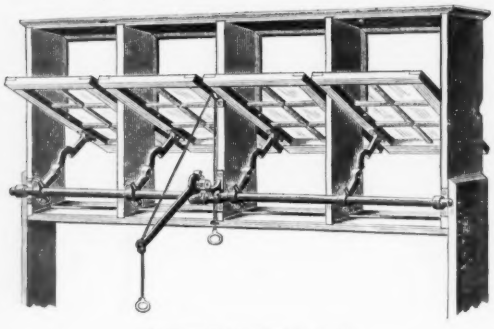

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Simple, always in order and always Locked, whether open or closed; no slamming.

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CIRCULAR SENT ON APPLICATION.

TO FLORIDA & TO NEW ORLEANS VIA THE QUEEN & CRESCENT ROUTE

Superb Vestibuled Trains FROM CINCINNATI

To Lexington, Chattanooga, Birmingham, Meridian, New Orleans, Atlanta, Macon and Jacksonville.

Through Sleeping Cars to Birmingham, Columbus, Albany, Knoxville, Asheville, Jackson, Vicksburg and Shreveport.

Through Tourist Sleeper, Cincinnati to Los Angeles and San Francisco every Thursday. Direct Route to the Southwest via New Orleans or via Shreveport.

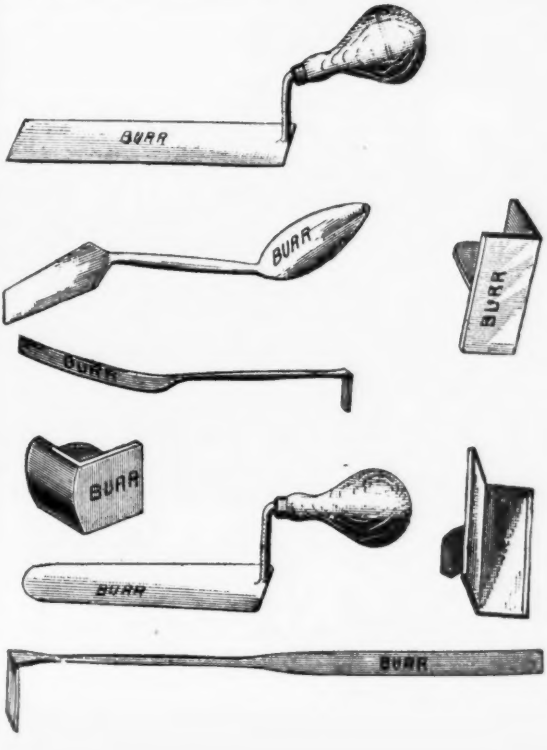
3 DAILY TRAINS TO CHATTANOOGA
Send for Literature and Time Tables.

C. A. BAIRD, T. P. A. Cor. Woodward & Jefferson, Detroit, Mich.

PLUMBAGO FACINGS.

PLUMBAGO Facings have come to stay. The value of plumbago facings, when rightly made, is unquestioned, But who can tell when they are rightly made? Plumbago can be adulterated with soapstone or talc, so as to deceive even the elect. The safety of the foundryman lies in buying his plumbago at headquarters, where no facings except plumbago facings are made—and mixing his facings to suit his wants. What is more, it is cheaper for him to do so. If any foundryman will write us, we will tell him how it is done and we will sand samples and prices of **Pure Plumbago Facings.**

Jos. Dixon Crucible Co., JERSEY CITY, New Jersey.



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FOR Years our tools have been the Most Popular in the Country and wherever introduced, Molders would use no other. They are made of the finest imported Steel, finely finished (no emery marks on our goods) and highly tempered They require no

"BREAKING-IN"

and will work smooth from the start. For sale by all first-class Foundry Supply Houses and Hardware Dealers. Send for catalogue and price list.

Burr's Damascus Works

813 River Street.

DETROIT, - MICH.

THE REASON WHY

.. YOU SHOULD USE ..

"Standard" Cupola Blocks

IS BECAUSE THEY ARE BETTER AND CHEAPER THAN THERS.

READ THIS

ILLINOIS MALLEABLE IRON CO.

WROUGHT IRON PIPE

Plumbers, Steam, Gas and Water Works Supplies,

MALLEABLE, GRAY IRON AND BRASS CASTINGS TO ORDER.

581 TO 601 DIVERSEY AVENUE.

Chicago, Jan. 14, 1895. 189

Garden City Sand Co.,

City.

Gentlemen:-

Replying to your inquiry as to our opinion of your Standard Fire Brick, will say, that we have been using them in our cupola linings for both grey and malleable iron for the past year. We have found them entirely satisfactory and to stand up to their work fully as well as higher priced brick, which we had been formerly using. We shall continue to order from you, as we need them.

We are,

Very truly yours,

Illinois Malleable Iron Co.,

By O. P. Thrall Supt.

See what one of the Leading Chicago Foundries say about "Standard" Cupola Blocks. Can you afford to allow your competitors to have the "best of it."

IN ADDITION TO THE ABOVE, PLEASE REMEMBER WHEN YOU WANT

Moulding Sand, Fire Brick, Facings, Shovels, Brushes, Riddles, Blakeny Cupolas, Etc.

TO BE SURE AND GET OUR PRICES.

WE GUARANTEE EVERYTHING WE SELL. WHY NOT WRITE US.

GARDEN CITY SAND CO.

FIFTH AVENUE AND MADISON STREET,

SECURITY BUILDING. CHICAGO.

"The Proof of the Pudding is in the Eating." . . . . . .

The S. Obermayer Co. are pioneers in the **Foundry Facing** and **Supply** business.

The S. Obermayer Co. is the largest establishment of its kind in the world.

The S. Obermayer Co. is the largest concern in the world, importing and refining **Ceylon or East India Plumbago, Graphite or Silver Lead**—also leaders in **German, Bohemian and Mexican Graphite or Black Lead.**

The S. Obermayer Co. have the largest mill in the world manufacturing exclusively, **Sea coal** or **Bituminous Facings** of the highest grades and the finest textures, the greatest strength and the purest in carbon and, in short, the BEST on earth. We refer to our mill at Larimer, Pa.

The S. Obermayer Co. have the newest and model mill of the world for the manufacture of fine grades of FOUNDRY FACINGS and BLACKINGS, and the best proof thereof, is that among the many handsome casting exhibited at the recent WORLD'S FAIR at Chicago; especially the beautiful STOVES there, shown by American Exhibitors, fully two-thirds were made with the aid of the **S. Obermayers Co's. incomparable stove-plate facings** and their refined, pure East India Plumbago; so it was also with most of the other classes of American castings exhibited there. The best were made with Obermayer facings or blackings. Is not that a record to be proud of?

In the year 1894, **we made and sold 11,452,700 pounds fine Foundry Facings, Plumbago, &c., and sold 868,100 pounds of Foundry Supplies,** at our factories in Cincinnati, Chicago and Larimer, Pa. This more than equals the combined production of all similar factories in the United States; and we are in a fair way to double that in 1895.

Our specialties are the manufactures of only the BEST qualities of qualities of FOUNDRY FACINGS or BLACKINGS, for the HIGHEST TYPE of MACHINERY, ARCHITECTURAL, STOVE-PLATE and FINE ART CASTINGS.

In connection with the above, we keep in stock, a large supply of all that a Brass, Iron or Steel Foundry requires to be thoroughly equipped.

Do not forget the wonderful effects that our **Silver Leads, Graphites, Plumbagos, Perfect, Peerless** and **Brilliant Washes** produce. The economy in using them also.

Trial samples of our Facings and other manufactures free of charge.

Illustrated catalogue and price-list of 118 pages mailed free on application.

THE S. OBERMAYER CO.

CINCINNATI, O.

CHICAGO, ILLS. LARIMER, PA.

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Finest Grades
Foundry Facings
Foundry Supplies
Foundry Equipments

IMPORTERS AND REFINERS OF

GRAPHITE, PLUMBAGO and INDIA SILVER LEAD.

MAKERS OF THE CELEBRATED

C. F. M. FOUNDERS' PERFECT WASH,
FOR CASTINGS MADE IN LOAM, DRY SAND, SKIN-DRIED, AND CORES OF ANY SIZE.

STOVE PLATE BLACKINGS,
EXTRA HEAVY STOVE PLATE,
CARBONIZED RETURN,
PURE CHARCOAL.

The Cleveland Facing Mill Co.,

THE FOUNDRY. CLEVELAND, OHIO.

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——DEALERS IN——

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Philadelphia Sand, French Sand,
Fire Clay, Kaolin, and Foundry
Facings and Supplies of all Kinds,
Lead Facings a Specialty.

515-17 West 15th Street, NEW YORK.

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BUFFALO OFFICE:
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Cheesequake Creek, N. J.
South River, N. J.
Raritan River, N. J.
South Amboy, N. J.
Wareham, Mass
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Waterford, N. Y.
Albany, N. Y.
Cedar Hill, N. Y.
Coxsackie, N. Y.
Clinton Point, N. Y.
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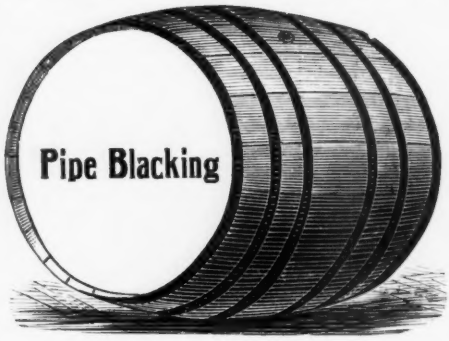
We would Call Your Attention to Special Grades



To those buying in Car-Loads, we can make an unprecedented inducement to buy the Best article ever manufactured.

GIVE US A TRIAL ORDER.

We have mills in the coal region at Lehighton, Pa. where we grind Pipe Blacking, Car Wheel Mineral, etc.

This brand is a superior article used in blacking the bell moulds on pipe.

We have mills in the coal region at Irwin, Pa. where we grind Bituminous or Sea coal Facing, Coke, Carbon, etc.

Salt-Hay, Hay-Rope, Molasses, Resin, Flour, &c.

MOULDING SANDS A SPECIALTY.

J. W. PAXSON & CO.

Office, Pier 45 N. Delaware Ave. PHILADELPHIA, PA.

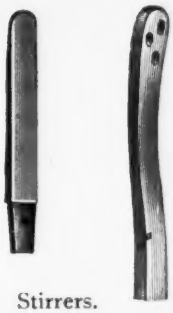
Crucible.

ROBT. J. TAYLOR & SON

Crucible

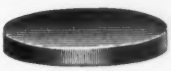
Dipper.

Jewelers'.



Stirrers.

Cover.



Cover.

Stopper.

Crucibles

For melting STEEL, BRASS, COPPER, GOLD AND ALL OTHER METALS. We are the only PRACTICAL MEN in our business and we work strictly by CHEMICAL ANALYSIS; our CRUCIBLES will be found UNIFORM and RELIABLE at all times; they are well known all over this country and also Europe; send us a trial order and we will secure you as a customer. Also FINE GRAPHITE for LUBRICATING PURPOSES, for the devolopement of High Speed and Great Power. Our GRAPHITE is the purest in the market as Analysis will prove.

ROBT. J. TAYLOR & SON,

1900 to 1916 CALLOW HILL STREET, PHILADELPHIA, PA.

ESTABLISHED 1872. INCORPORATED 1895.

McCullough-Dalzell Company

MANUFACTURERS OF . . .

CRUCIBLES

FOR STEEL MELTING
FOR BRASS MELTING
FOR FILE TEMPERING

COVERS
SKIMMERS
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CAPS
STIRRERS
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STOPPERS

FOR BESSEMER PLANTS
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PLUMBAGO ARTICLES OF ALL SORTS
USED . IN . MELTING . STEEL, . BRASS,
ALUMINUM, GOLD AND SILVER . . . . .

The co-partnership heretofore existing under the firm name of McCullough, Dalzell & Co., has been dissolved by mutual consent so as to become incorporated. The business carried on by said firm will be continued by the undersigned Corporation.

McCULLOUGH-DALZELL COMPANY

Office and Works:
36th Street and A. V. Ry.

PITTSBURGH, PA., U. S. A.

The Acme Cupola Block

Not any higher in price than other high grade Fire Brick, but much better for Cupola Lining, because they are made to

Stand the Wear and Tear, As well as the Highest Heats.

High grade brick are usually soft and wear away easily, while a hard brick seldom has the required refractory qualities and melts. With the ACME BLOCK we overcome these faults. They neither melt or crumble easily in the cupola.

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OHIO'S CHOICEST GRADES.

GLENFORD No. 10—For Stove Plate, Hollow Ware, Malleable Iron and Light Castings. No. 4 and 5 for Light Machinery, Soil Pipe, General Jobbing, etc.

SANDUSKY No. 1—Fine open grade for Agricultural and General Castings. No. 2 (The new Sandusky) a strong grade, excellent wearing qualities.

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RED HILL—The best of fine brass sands.

Always glad to furnish samples and any information in regard to their use. Send for circular showing who use our sands and what they use them for.

The Ohio Sand and Clay Co.

THE FOUNDRY. COLUMBUS, O.

You are making a mistake

IF YOU ARE NOT BUYING YOUR MOLDING SAND AND FIRE CLAY OF

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TWELVE YEARS' EXPERIENCE

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Ask for SAMPLES and PRICES.

MOLDING SAND
FIRE SAND
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CRUSHED ROCK AND FIRE CLAY

MOST PROMPT ATTENTION TO CORRESPONDENCE AND SHIMENTS.
GIVE US A TRIAL ORDER AND WE WILL PLEASE YOU.

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We Can .. Furnish

ANY GRADE OF

Moulding Sand ...

THAT WILL TURN OUT SMOOTH AND PERFECT

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Heavy Machinery Castings
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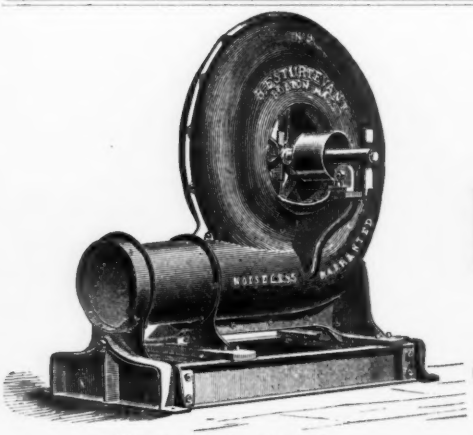
WE CAN SUPPLY YOU WITH

FIRE CLAY, FIRE SAND, CORE SAND, FIRE BRICK, CUPOLA BRICK, BRISTLE BRUSHES, STEEL WIRE BRUSHES, BLOWERS, Etc.

The J. Downerd & Son Co.,

216 MAIN STREET, ZANESVILLE, O.



Blower on Adjustable Bed.

THE STURTEVANT STEEL Pressure Blowers,

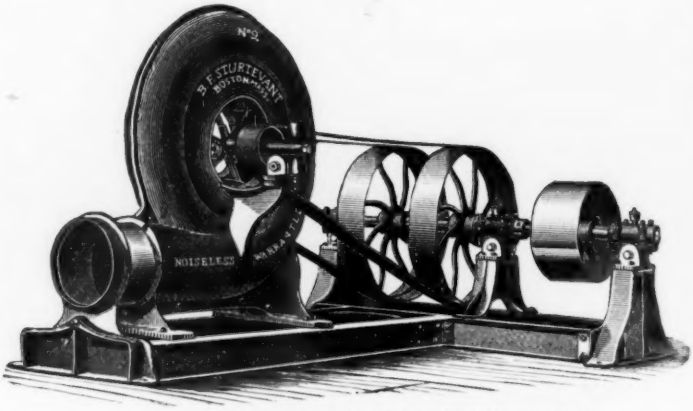
—FOR—

Cupola Furnaces and Forge Fires.

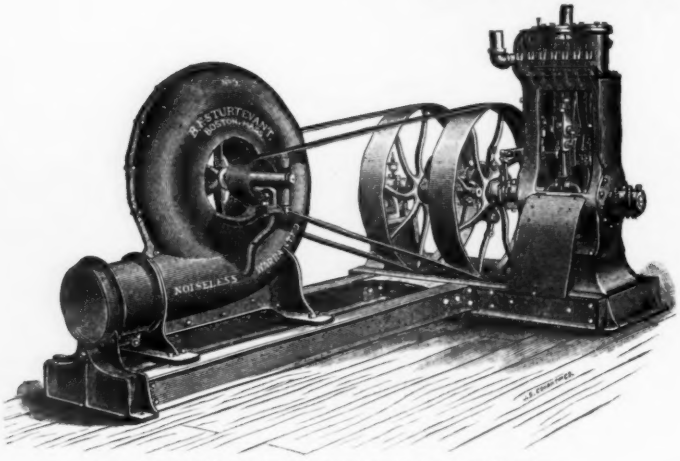
BLOWERS

Furnished without Bed with Separate Countershaft

BLAST GATES



Blower on **Adjustable** Bed with Combined Countershaft.



Blower on Adjustable Bed with Double Enclosed Engine.

BLOWERS

WITH

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Direct Connected

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Send for Catalogue.

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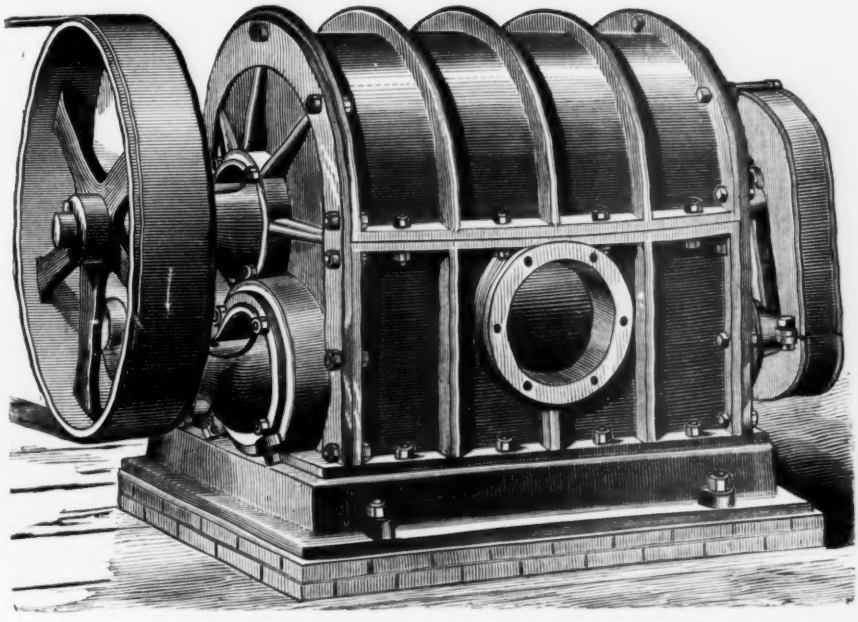
The Baker Rotary Pressure Blower

ONLY ONE BELT IS REQUIRED TO DRIVE THE LARGEST BLOWER.



The Best POSITIVE PRESSURE BLOWER for IRON FOUNDRY CUPOLAS, Pneumatic Tubes, Water Gas Works, Smelting Silver, Lead, or Copper Ores, Sand Blast, Forge or Knobling Fires, Ventilating Mines or Tunnels or any other purpose requiring a POSITIVE BLAST OR EXHAUST.

Wilbraham Baker Blower Co.,

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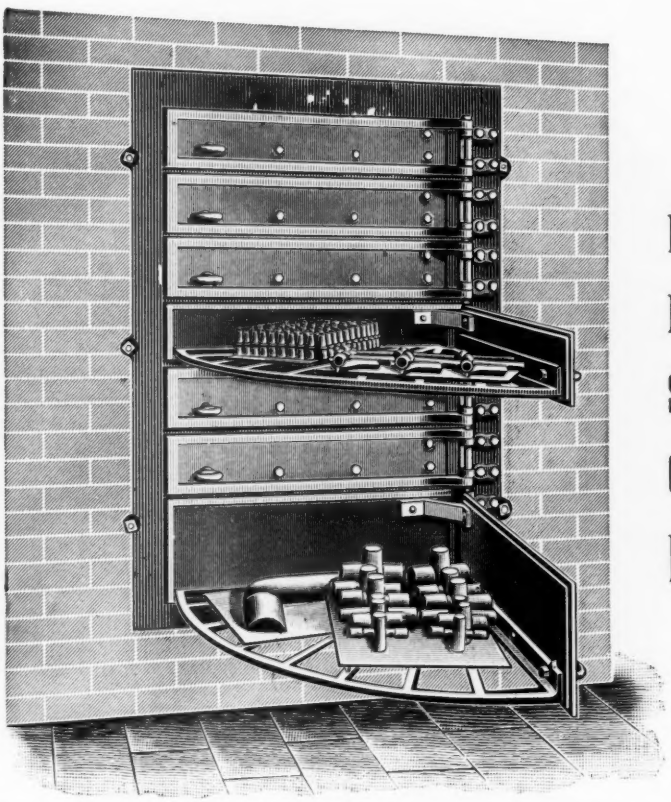
Millett's Patent Core Oven

—With—

Double Doors, one at the back of shelf closing the oven when wide open.

Patented July 19, 1887.

Saves Fuel
Saves Expense
Saves Time
Does more work
Makes Better
CORES.



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One Hundred in use and every one gives satisfaction.

Write us for circulars and prices.

Millett Core Oven Co.,

Brightwood, Mass.

FOR SALE BY J. W. PAXSON & CO., PHILADELPHIA, PA.

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(CAPITAL PAID-UP $250,000.)

MANUFACTURERS OF

HIGH GRADE COKE

We Make a specialty of 72 Hour Foundry Coke.

ANALYSIS:

Vol. Matter,	1.13
Carbon,	88.21
Ash,	10.66
Sulphus,	.86
Phosphorus,	.017

These Few Lines tell the Story.

Try it. It is from a newly developed coal adjacent to the heart of the Connellsville Coke Bed. Freight rate is 16 cents per ton less than Connellsville. Shipments to all points via P. & L. E, L. S. & M. S. and N. Y. L. E. & W. Rys, and connections, only.

Correspondence solicited.

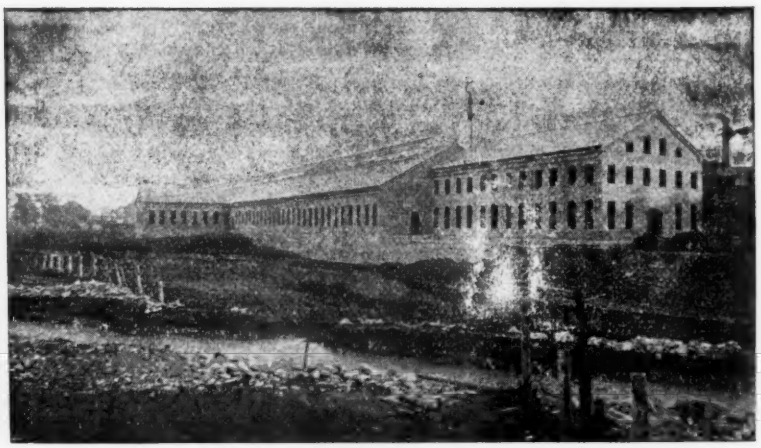
N. P. HYNDMAN, Sales Agent,

Room 8, Conestoga Building, 7 Wood St.

General Office, DAWSON, PA. **PITTSBURG, PA.**

Wrought Iron Bridge Co.,

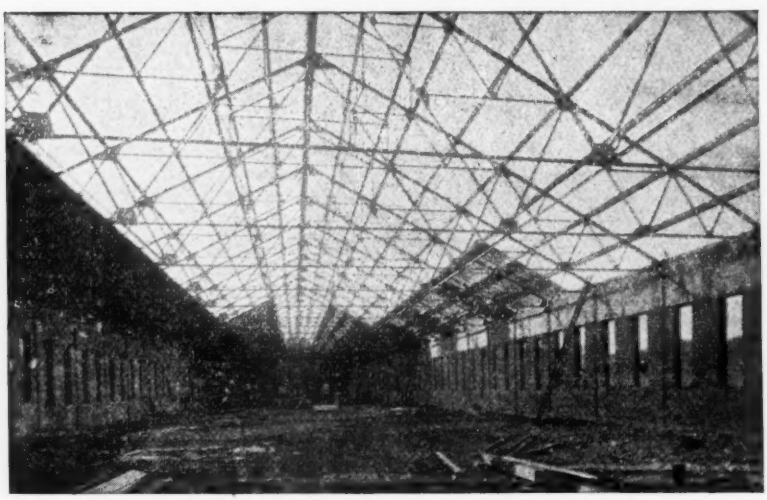
DESIGNERS AND BUILDERS IN
IRON AND STEEL
FIRE PROOF BUILDINGS



FOUNDRIES, MACHINE SHOPS
— FOR —
ETC., ETC.

Exterior of Foundry of Warder, Bushnell & Glessner Co., Springfield, Ohio.

Traveling and Jib Cranes for handling
Heavy Castings and Machinery.



Buildings Designed for Special
Requirements.

Interior Foundry Building of Warder, Bushnell & Glessner Co., Springfield, Ohio.

The roof of this building was erected by the Wrought Iron Bridge Co., Canton, Ohio, and consists of steel trusses supporting wooden purlins to which matched and dressed sheeting is nailed for slating. Trusses being 18 ft. above the floor, the wood work of roof is out of danger from fire, while the cover being of slate a suitable cornice to protect the overhanging of roof from flying sparks, or heat from the burning of neighboring buildings, renders this structure absolutely fire proof. Windows are set in the sides of ventilator throughout its entire length, so that ample light and ventilation is insured.

Wrought Iron Bridge Co.

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CANTON, O. KANSAS CITY, MO. CHICAGO, ILL.

136 Liberty St., NEW YORK.

CHAS. M. JARVIS, President and Chief Engineer.
GEO. H. SAGE, Secretary

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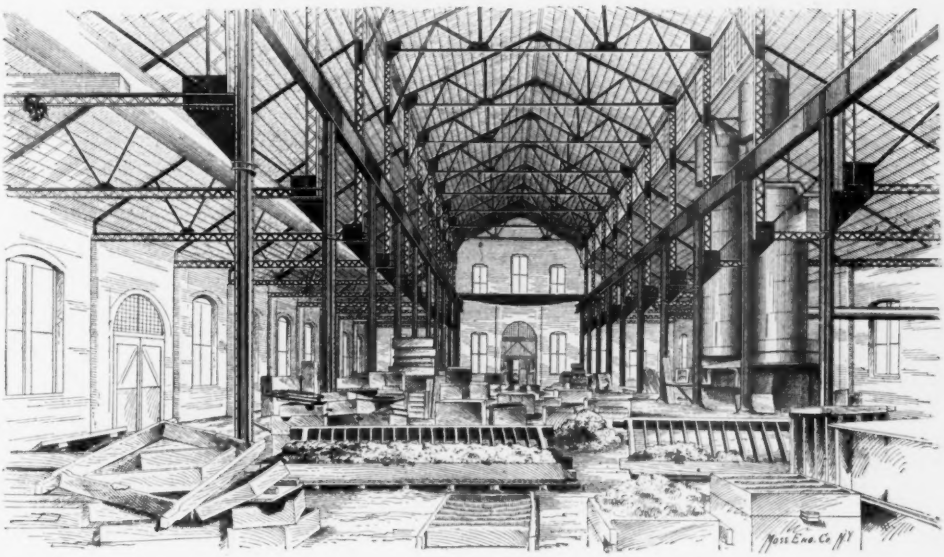
THE BERLIN IRON BRIDGE CO.,

ENGINEERS, ARCHITECTS

—AND BUILDERS OF—

Iron and Steel Bridges, Roofs and Buildings.



The above illustration is taken direct from a photograph and shows the interior of a foundry, the framework of which was designed and built by us for the Brooks Locomotive Works, at Dunkirk, N. Y.

The building is 100 feet in width and 225 feet in length, the central portion being controlled by a travelling crane.

Office and Works, - - EAST BERLIN, CONN.

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Burlington & Missouri River R. R. in Neb.
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Kansas City, St. Joseph & Council Bluffs R. R.
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Over 7,000 Miles of Railroad Under One Management.

MANUFACTURERS contemplating the removal of their plants or the building of branch ones in the West are urgently requested to communicate with the undersigned.

OPPORTUNITIES, RESOURCES, ASSISTANCE.—THE BURLINGTON ROUTE reaches with its own line nearly every place of note in ILLINOIS, IOWA, MINNESOTA, MISSOURI, NEBRASKA, KANSAS, DAKOTA, WYOMING, COLORADO, and has direct connections to every point in America.

EVERY CONCEIVABLE RESOURCE in the shape of RAW MATERIAL, such as IRON ORE, COAL, COPPER, ZINC, TIN, GOLD and SILVER and OTHER METALS; thousands upon thousands of miles of forests, containing almost unlimited quantities of HARD and SOFT WOODS; CLAYS OF ALL KINDS AND FOR EVERY PURPOSE; inexhaustable stone quarries of every description; immense quantities of TAN BARK, Flax Straw, in fact, everything that is found in the ground or above the ground can almost surely be found somewhere on the vast BURLINGTON ROUTE.

MANUFACTURERS OR OTHERS, desiring any information regarding Materials, Accessibility to Markets, Best Cities and Towns to locate in, what these places offer as inducements, etc., will do well to write for information.

There are more Manufacturing Industries located on the lines of THE BURLINGTON ROUTE than on any other railroad in the United States

The interests of THE BURLINGTON ROUTE AND THOSE OF A MANUFACTURER OR LOCATOR UPON ITS LINES, ARE MUTUAL.

THE INDUSTRIAL DEPARTMENT of this road possesses the information you want. If not, it will procure it for you without any cost to you. This Department is as complete as any Railroad Industrial Department in the world. Will appreciate any correspondence requesting information, etc.

This Department will make the work and worry of seeking a suitable and advantageous location easy for you.

For detailed information and for large county maps of the territory covered by the Burlington lines write to, or call upon **GEO. H. ROSS, Superintendent, INDUSTRIAL DEPARTMENT BURLINGTON ROUTE, General Offices, ADAMS AND FRANKLIN STREETS, CHICAGO.**

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FROM CHICAGO AND ST. LOUIS TO

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And all Points in Colorado, Utah and California,

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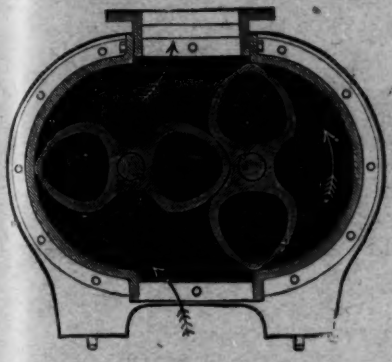
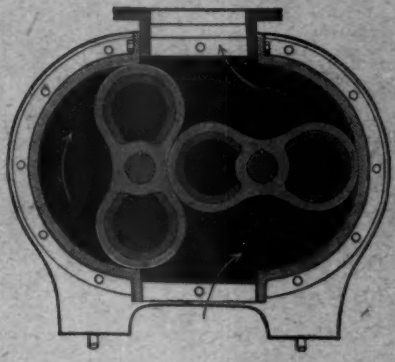
Roots' Positive Pressure Blowers



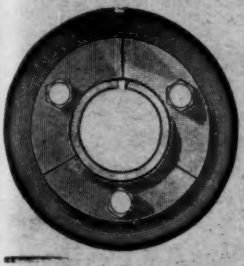
1859

1895

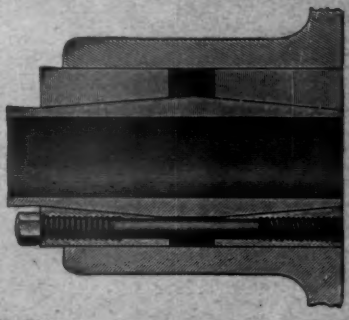


Roots' Standard Blower.
Best adapted to all kinds of smelting purposes, forced draught or suction.

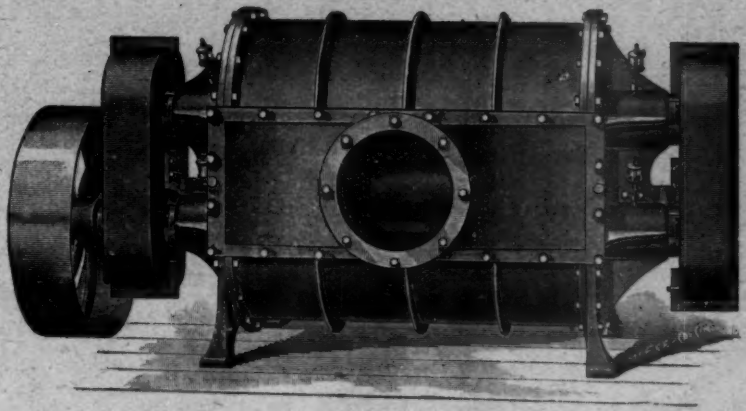
Roots' True Circle Blower.
Best adapted to high pressures, pneumatic tubes, etc.



Mechanical Construction Unequaled. Top, Bottom or Side Discharge.



THE ONLY PERFECT JOURNAL BOX FOR POSITIVE PRESSURE BLOWERS.



P. H. & F. M. Roots Co.,

Connersville, Indiana.

—ESTABLISHED 1859—

ROOTS' POSITIVE
PRESSURE BLOWER

Superior to All Others.

The principles upon which our Blowers are constructed are so different from competing machines that we are enabled to design and construct them in such a manner that, with proper attention, the maximum degree of efficiency can be maintained their entire life-time. We have Blowers in operation to-day which have been running for twenty-five years.

Compared to the Blowers we built twenty-five years ago, those we build to-day are far superior in every respect, so that it is impossible for our present machines to gradually deteriorate, as others do, the longer they are used.

Naturally, the high standard of mechanical excellence to which we have brought our latest improved machine, is the result of our efforts for the last thirty-five years to reach this point.

The only positive pressure blower that can be run at a high speed with perfect safety.

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DIRECTORY OF LEADING PIG IRON DEALERS.

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CLINTON IRON & STEEL CO.

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CLINTON INSPECTED FOUNDRY IRON

CELEBRATED "CLINTON" SOFTENER

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LEE CHAMBERLAIN & CO.,

PIG IRON.

Rooms 44, 45 and 46 Board of Trade,

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St. Louis Office, Laclede Building

F. A. GOODRICH & CO.

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PIG IRON, STEEL, COKE, ETC.

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BUFFALO,

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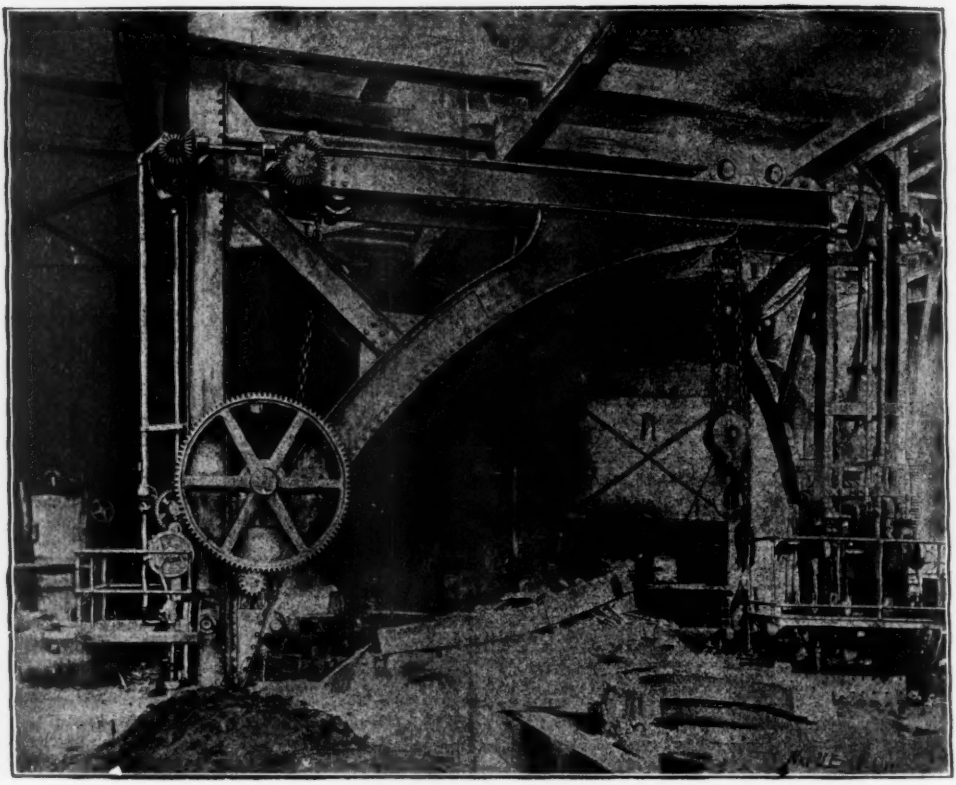
JOHN J. SHIPHERD, Pres. W. RUSSELL, Vice-Pres. and Mgr.
L. C. SHIPHERD, Sec'y and Treas.

THE

Phœnix Iron Works Co.



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Hand, Steam, Belt, Hydraulic and Electric Cranes

FOR ALL PURPOSES.

Foundry Ladles, Chains, and General Machinery

WASON STREET.

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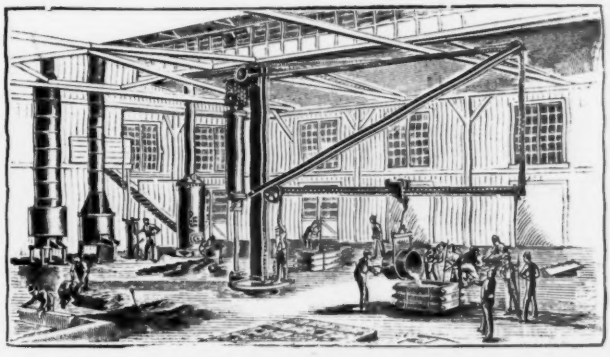
"The Proof of the Gravy is a Lickin' the Spoon."



5-ton Ridgway Crane in a Foundry.

Mr. A. B. Farquhar, York, Pa., has probably the largest Agricultural Machinery Works in the country. His present foundry is away behind the times, and he is going to put up a new one and make it one of the best that money will buy. He was anxious to know what Crane to adopt. He saw this 'ad.' with its BIG PROMISES and CLAIMS, and asked for circular. Expect he thought we would come to see him as he is in the next county. But we didn't—we don't bother anybody—we just asked him to INVESTIGATE. He did so and then sent for us. Said he—

"Ridgway, if what you say is true your Crane is what I want. I tell you what to do. Go home and make me a little 5-ton Crane for the old foundry. I'll set it up there and try it, and know for myself all about it, and whether I'll want it for the new shop."

WISE MAN, WASN'T HE?

Well, we made the Crane, and here is what he has just written us:

RIDGWAY & SON, YORK, PA., June 24, 1895

GENTLEMEN:—Enclosed please find check for $———, covering amount due for Steam-Hydraulic Crane purchased of you 30 days since. **The Crane does all you claim for it, and we believe it the best that has ever been designed for Foundry use.**

Respectfully, A. B. FARQUHAR CO.

Do we tell fairy stories? Our claim for this Crane we know are hardly credible to folks who don't know the machine—but they are confirmed by the most exacting and critical of people. Go right on fooling your maney away on other Cranes if you want to, but never say you didn't see the sign boards.

Craig Ridgway & Son,

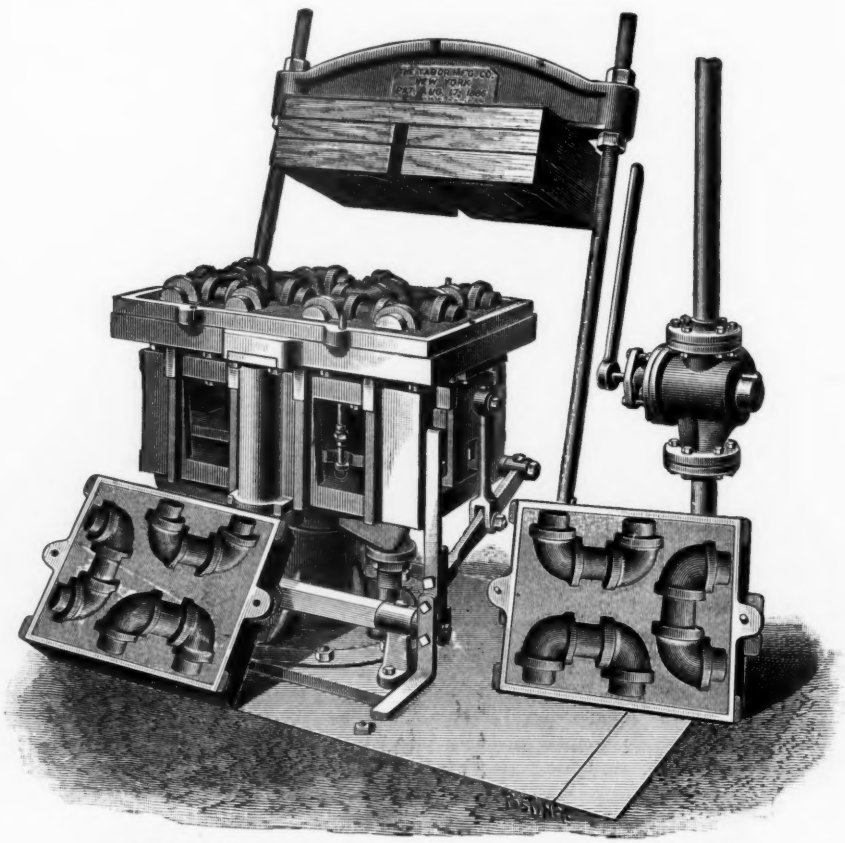
COATESVILLE, PA.

The Tabor Manufacturing Co.,

—MANUFACTURERS OF—

AUTOMATIC MOLDING MACHINES

For Sand Molds for Metal Castings.



AUTOMATIC DUPLEX MOLDING MACHINE.

Molds both parts of flask at one operation of machine, thus making two machines in one.

These machines are adapted to general castings when made in reasonable quantities.

The use of these machines is a guarantee of economy, greater quantity and better quality in castings.

Foundrymen who are interested in producing cheap castings of superior quality are invited to correspond with the Company and call at the works, Front and Franklin Streets, Elizabeth, N. J., and see the machines in operation.

113 Liberty Street,

NEW YORK, - - - N. Y.

Cupola Furnaces
Blowers
Cranes
Compressors
Hoists
Elevators
Foundry and
Core Oven Cars
Wheel Barrows
Ladles
Reservoirs
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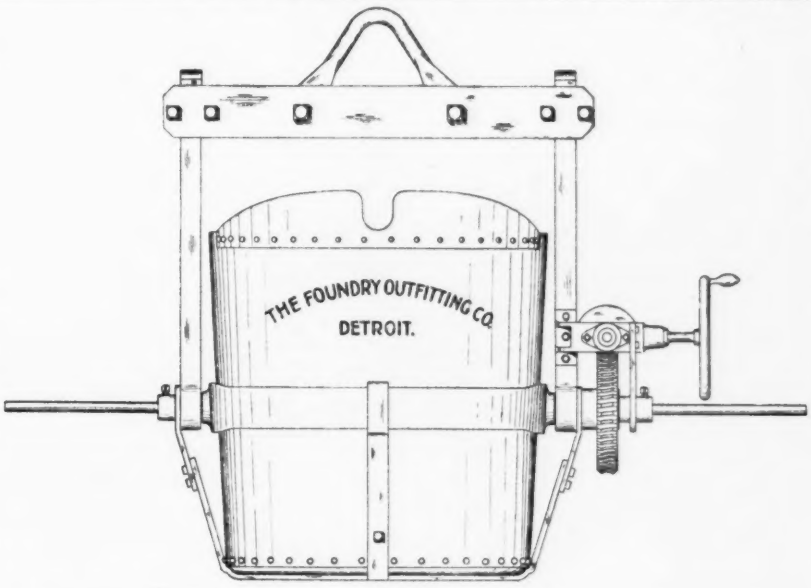
LADLES

Did you say? We make and can ship promptly any size from

35 Pounds to 40 Tons.

If there is anything "betwixt or between" you want, say so . . . . . .



Core Ovens
Sand Sifters
Brass Furnaces
Barrows
Testing Machines
Trolley Tracks
Foundry Lights
Flasks
Separating Machines
Fire Brick
Fire Clay
Molding Sand

This is our latest style Geared Ladle. How do YOU like it?

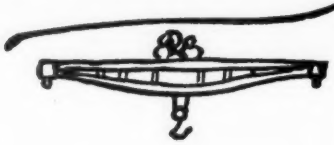
"Everything Used in a Foundry."

WRITE US,

The Foundry Outfitting Co.

DETROIT, MICH.

We make Cranes!



ALL kinds; no matter what kind you want, we can build it for you. Traveler or Jib, Electric, Pneumatic, Steam, or Hand Power. Let us know what you want to lift and we will build the crane to suit your case. Where there is a load to lift, we can build a crane to lift it. Air Hoists, too; every design and improvement. Send for prices and circulars.

The Whiting Cupola

Better get under cover before prices go higher. You can't compete unless you have a **"Whiting."** It saves its cost right away, and then goes on saving.

Bauer's Patent Tumbler—A great Power Saver.
Geared Ladles—New designs; all sizes.
Foundry Elevators—Electric, Belt, Pneumatic.
Trucks, Turntables, Core Oven Equipment, Etc

We make all of the above—You buy of the Maker when you buy of Us.

Whiting Foundry Equipment Company,

1522 Monadnock Block, CHICAGO.

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UNEQUALLED
EFFICIENCY, DURABILITY,
MINIMUM POWER.
BUFFALO
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BUFFALO, N.Y.
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THE WORLD'S STANDARD.
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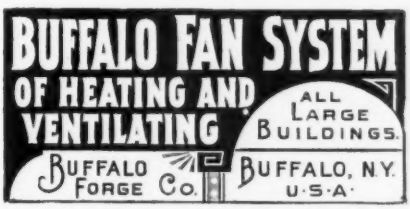
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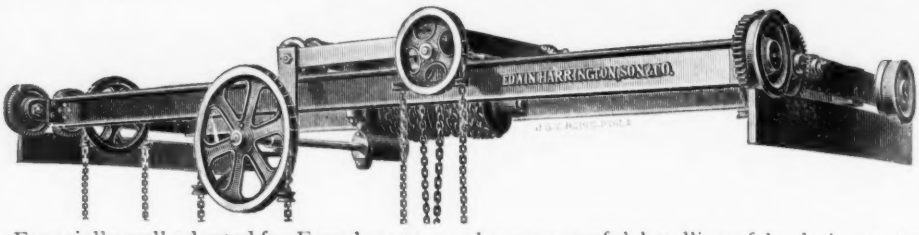

Especially well adapted for Foundry use or wherever careful handling of loads is required. Thus copes and moulds can be lifted and transported with absolute safety. There is no jumping of chains; no jarring of load; no loss of sand; no breaking down of mould.

Will Hold the Load at any Point.

The chains wind on a drum, having right and left spiral threads. The hand chain wheel is removed from the line of the load by means of extended shaft, a fact which is of great advantage to the operator. The crane is supplied with roller bearings and travels with an easy steady movement. It is equally well adapted for heavy or light loads.

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THE ART OF MOLDING

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Practical Molder and Manager of Foundries.

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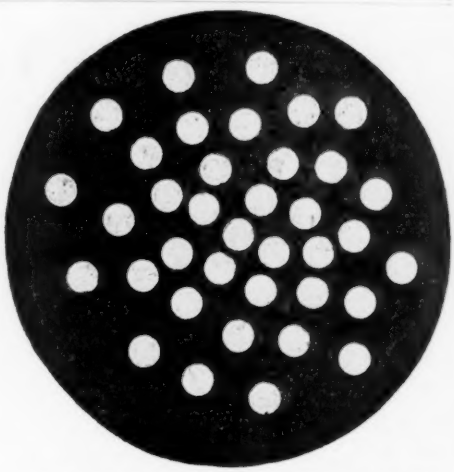

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HALF-INCH TEST BAR TWISTED.
"CLINTON INSPECTED FOUNDRY IRON" DOES THIS.

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Made in nine different sizes. Largest manufacturers in the United States of TUBULAR BARROWS, STEEL CHARGING BARROWS and WOODEN BARROWS of every variety. Write for catalogue to

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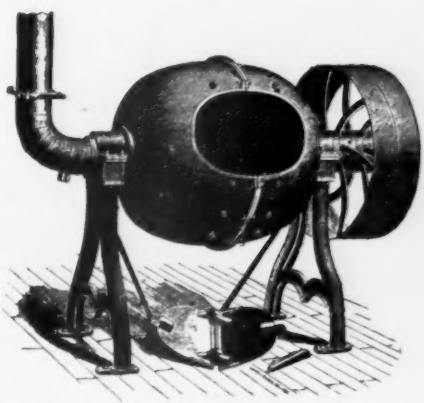
EXHAUST TUMBLING BARREL



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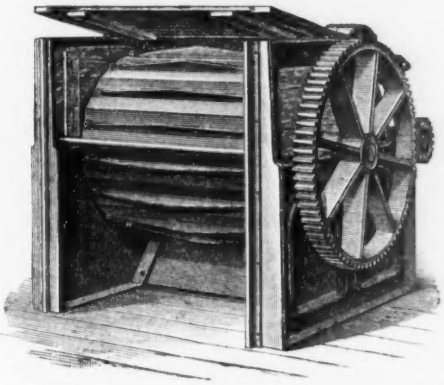

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Something Entirely New and Cheap.

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Are the Neatest, Handiest and Best on the Market.

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The only foundry paper published in the world, and an authority on all matters pertaining to the foundry business.

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Single subscription to all parts of the United States and Canada, $1 per annum.
" " Universal Postal Union, 1.50 "
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The publishers of THE FOUNDRY appreciate the fact that it is customary for publications, especially the class known as Trade Journals, to quote a rate for advertising from which greater or less discounts are given, according to the persistency of the advertiser. This system is manifestly unfair as tending to show partiality. We have deducted the usual discount before quoting rates, thus giving it to all alike, and no reduction of any sort on the above rates can be made.

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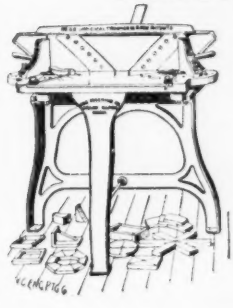
In Pattern Making was the result of the introduction of the

FOX UNIVERSAL TRIMMER

Our first machines were considered marvelous time and money savers, as they saved fully one quarter of the cost of patterns. Our latest machine, **STYLE E,** is a combination of utility and convenience such as our ten years of experience in this line has proved essential and desirable

ACCURATE! POWERFUL! CONVENIENT!



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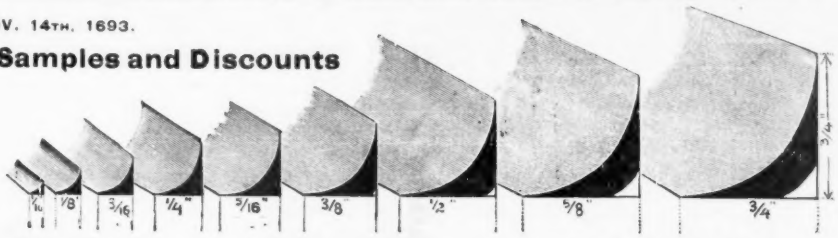

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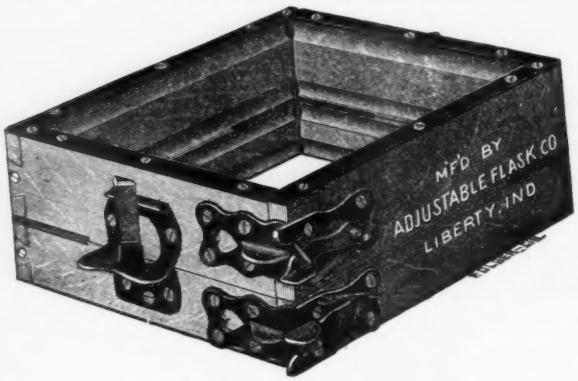

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All styles and sizes. The cut shows our **Solid Taper Snap Flask** which are unusually light and strongly made of ¾ inch soft maple, well seasoned, fitted with our latest improved hinge and **Automatic Spring Latch.** Tapers ¼ inch to 1 foot, just enough to allow slip boxes to go over molds and fit snug.

ADJUSTABLE SNAP FLASK Co

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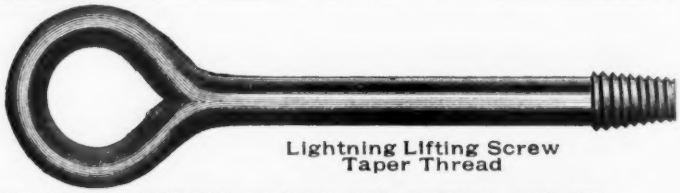
SAVE

Your Patterns



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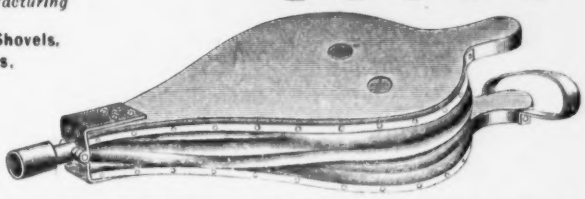
Wire and Bristle Brushes, Mallets, Rammers, Shovels, Galvanized and Brass Riddles, Spray Cups, Platers' Brushes, Etc.

99-101 W. Monroe St, CHICAGO

Bellows Patent, April 5th, '95



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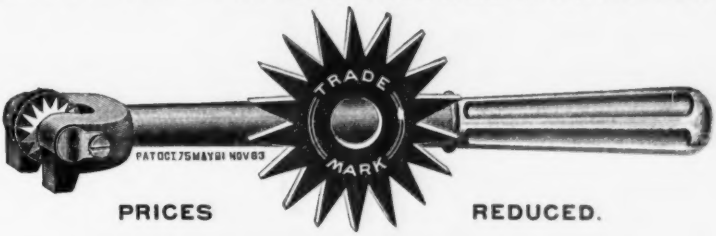

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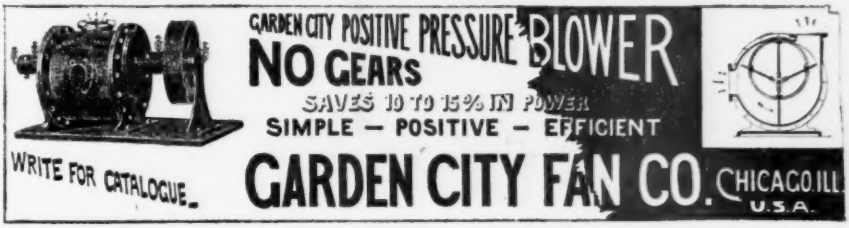
Sole Manufacturers of Genuine Huntington Emery Wheel Dresser.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SPECIAL FOR PATTERNS.
Samples Free.

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Pegs 1 inch diameter.

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Used by the Principal Foundries in the U. S.

Prepared ready for use in **LIQUID FORM** to be mixed with the regular core sand. The cores are **DAMP-PROOF** and do not absorb moisture. **SPUTTERING** and **BLOWING** by reason of damp cores are avoided. The cores are **HARDER, FIRMER** and **STRONGER** than can be made by any other process and cost less to make. They can be set at any time and **EASILY CLEANED FROM THE CASTING.** Send for our descriptive pamphlet with prices and directions for use.

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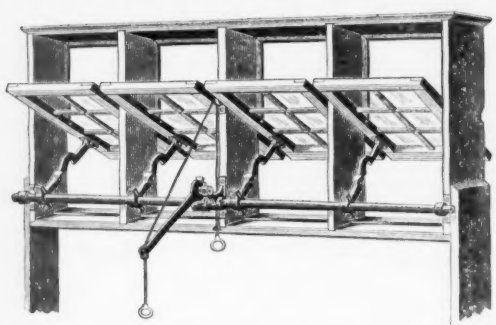

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PLUMBAGO Facings have come to stay. The value of plumbago facings, when rightly made, is unquestioned, But who can tell when they are rightly made? Plumbago can be adulterated with soapstone or talc, so as to deceive even the elect. The safety of the foundryman lies in buying his plumbago at headquarters, where no facings except plumbago facings are made—and mixing his facings to suit his wants. What is more, it is cheaper for him to do so. If any foundryman will write us, we will tell him how it is done and we will sand samples and prices of **Pure Plumbago Facings.**

Jos. Dixon Crucible Co., JERSEY CITY, New Jersey.

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"Standard" Cupola Blocks

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FOUNDRYMEN,
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Jan. 14, 1905

The Garden City Sand Co
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Very truly
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See what one of the Leading Chicago Foundries say about "Standard" Cupola Blocks. Can you afford to allow your competitors to have the "best of it."

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TO BE SURE AND GET OUR PRICES.

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The S. Obermayer Co. is the largest establishment of its kind in the world.

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The S. Obermayer Co. have the largest mill in the world manufacturing exclusively, **Sea coal** or **Bituminous Facings** of the highest grades and the finest textures, the greatest strength and the purest in carbon and, in short, the BEST on earth. We refer to our mill at Larimer, Pa.

The S. Obermayer Co. have the newest and model mill of the world for the manufacture of fine grades of FOUNDRY FACINGS and BLACKINGS, and the best proof thereof, is that among the many handsome casting exhibited at the recent WORLD'S FAIR at Chicago; especially the beautiful STOVES there, shown by American Exhibitors, fully two-thirds were made with the aid of the **S. Obermayers Co's. incomparable stove-plate facings** and their refined, pure East India Plumbago; so it was also with most of the other classes of American castings exhibited there. The best were made with Obermayer facings or blackings. Is not that a record to be proud of?

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FOR CASTINGS MADE IN LOAM, DRY SAND, SKIN-DRIED, AND CORES OF ANY SIZE.

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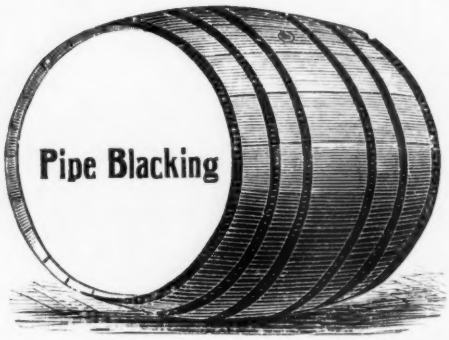

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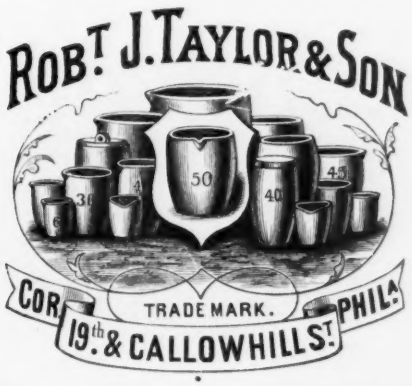

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Stirrers.

Cover.

Cover.

Stopper.

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For melting STEEL, BRASS, COPPER, GOLD AND ALL OTHER METALS. We are the only PRACTICAL MEN in our business and we work strictly by CHEMICAL ANALYSIS; our CRUCIBLES will be found UNIFORM and RELIABLE at all times; they are well known all over this country and also Europe; send us a trial order and we will secure you as a customer. Also FINE GRAPHITE for LUBRICATING PURPOSES, for the devolopement of High Speed and Great Power. Our GRAPHITE is the purest in the market as Analysis will prove.

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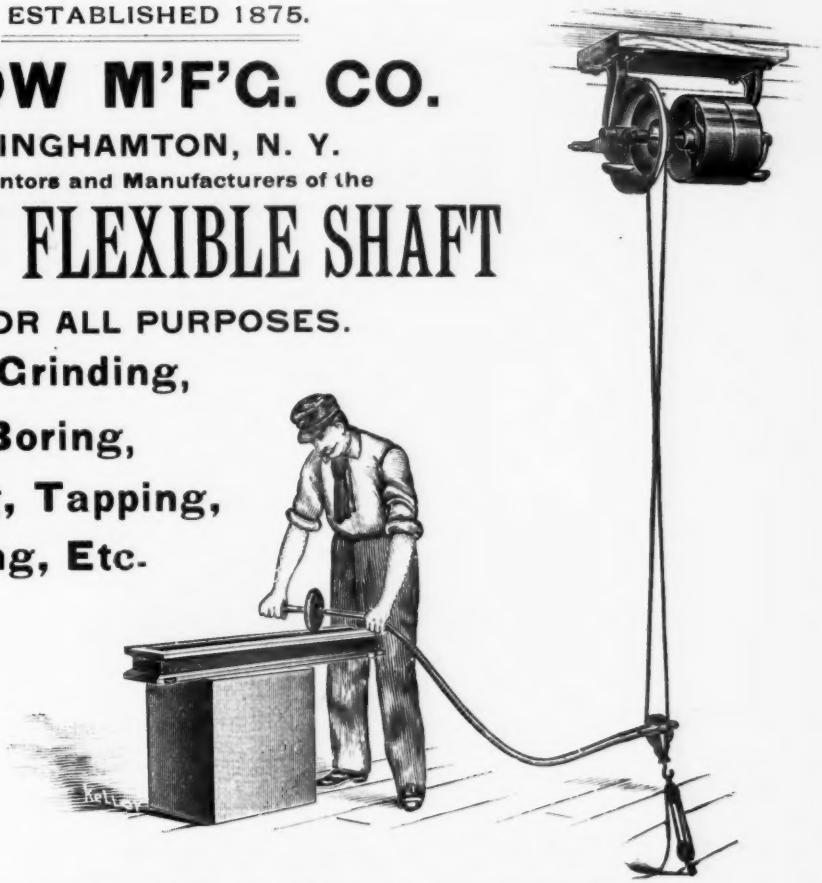

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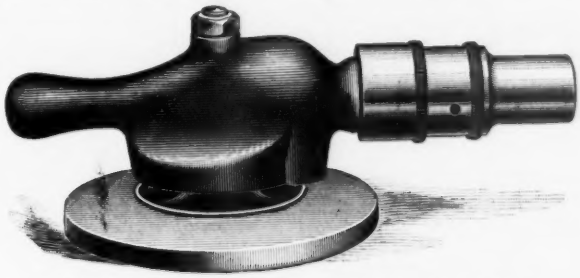
For no tool we manufacture has there been so rapidly increasing demand as for our **Portable Emery Grinder.** It is giving perfect satisfaction to hundreds of our customers. For cleaning and grinding heavy castings, for buffing and polishing all metals and glass it is almost indispensible, and a great time and labor saver. The above cut shows the tool running emery wheel on edge—below we illustrate our appliance which is to be substituted for the clamp spindle when grinding, shaping and polishing flat surfaces.



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In Mining and Shipping SAND and CLAY, enables us to ship you just what you need. We can send you any grade of MOLDING SAND you may require, from the finest to the coarsest, and guarantee quality always the same. Order our No. 0 Sand for Brass Castings; our No. 1 SAND for light malleable castings and bench work; our No. 2 SAND for stove-plate, hollow ware, malleable castings and heavy brass pieces; our No. 3 SAND for agricultural and medium weight castings, light machinery and car wheels; our No. 4 SAND for very heavy castings of any kind. It is very strong and open, a good wearer and is always sure to turn out a perfect casting. Our CRUDE FIRE CLAY is guaranteed to be first-class and to work plastic readily in water.

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Ask for SAMPLES and PRICES.

MOST PROMPT ATTENTION TO CORRESPONDENCE AND SHIMENTS. GIVE US A TRIAL ORDER AND WE WILL PLEASE YOU.

We also Furnish Leading Foundries with what they want for High Grade Machinery Work.

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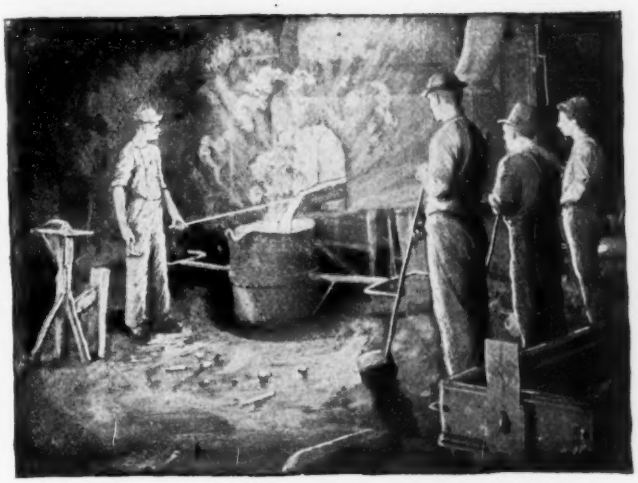

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THAT WILL TURN OUT SMOOTH AND PERFECT

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Heavy Machinery Castings
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WE CAN SUPPLY YOU WITH

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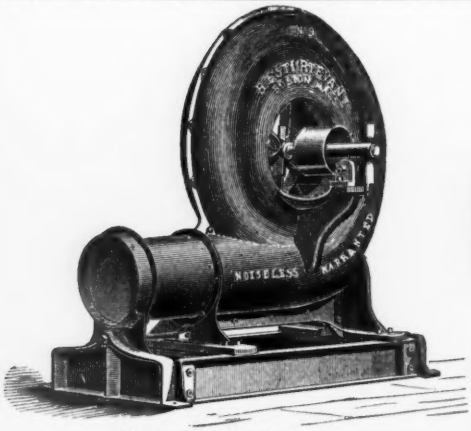

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THE STURTEVANT STEEL Pressure Blowers,

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Cupola Furnaces and Forge Fires.

BLOWERS

Furnished without Bed with Separate Countershaft

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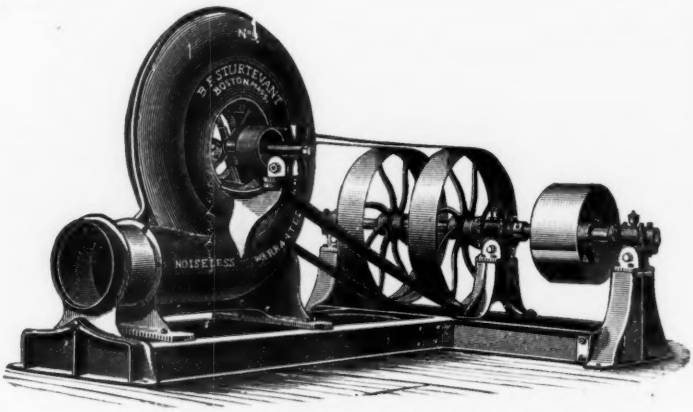
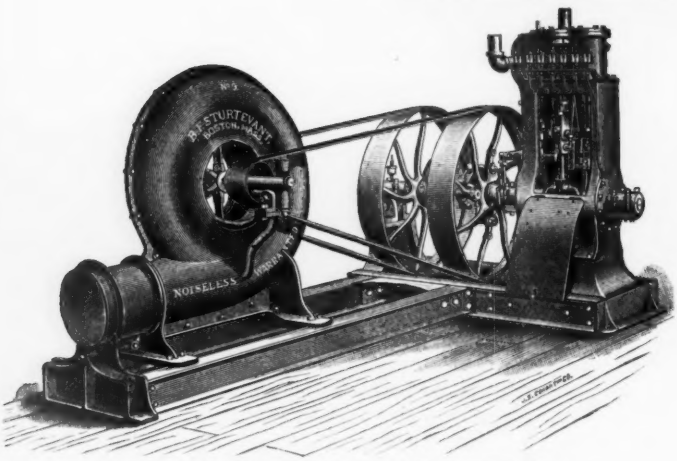


Blower on Adjustable Bed with Combined Countershaft.



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Direct Connected

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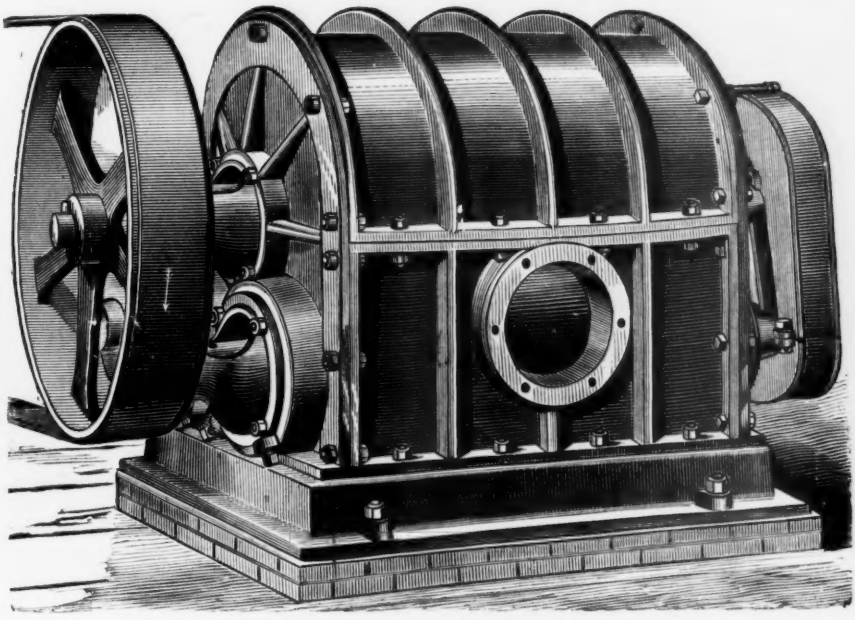
ONLY ONE BELT IS REQUIRED TO DRIVE THE LARGEST BLOWER.



The Best POSITIVE PRESSURE BLOWER for IRON FOUNDRY CUPOLAS, Pneumatic Tubes, Water Gas Works, Smelting Silver, Lead, or Copper Ores, Sand Blast, Forge or Knobling Fires, Ventilating Mines or Tunnels or any other purpose requiring a POSITIVE BLAST OR EXHAUST.

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Millett's Patent Core Oven

—With—

Double Doors, one at the back of shelf closing the oven when wide open.

Patented July 19, 1887.

Saves Fuel
Saves Expense
Saves Time
Does more work
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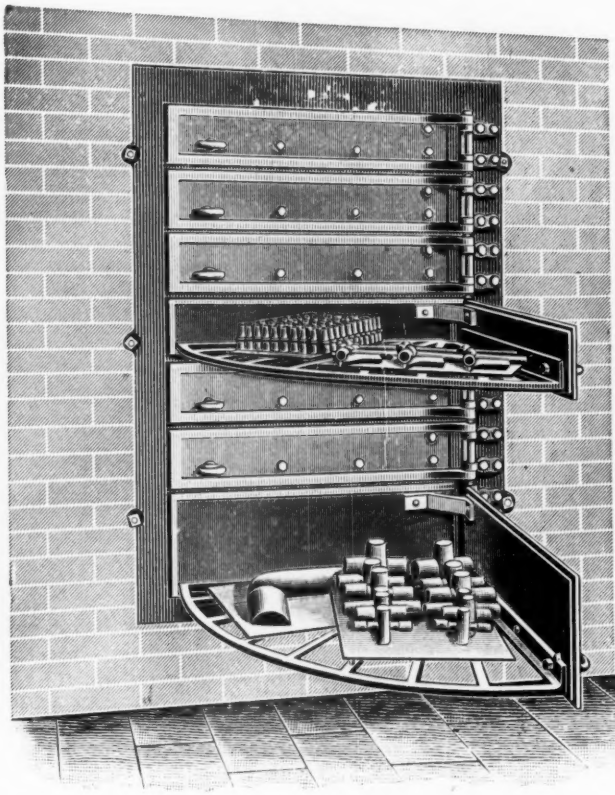

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HIGH GRADE COKE

We Make a specialty of 72 Hour Foundry Coke.

ANALYSIS:

Vol. Matter,	1.13
Carbon,	88.21
Ash,	10.66
Sulphus,	.86
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These Few Lines tell the Story.

Try it. It is from a newly developed coal adjacent to the heart of the Connellsville Coke Bed. Freight rate is 16 cents per ton less than Connellsville. Shipments to all points via P. & L. E., L. S. & M. S. and N. Y. L. E. & W. Rys, and connections, only.

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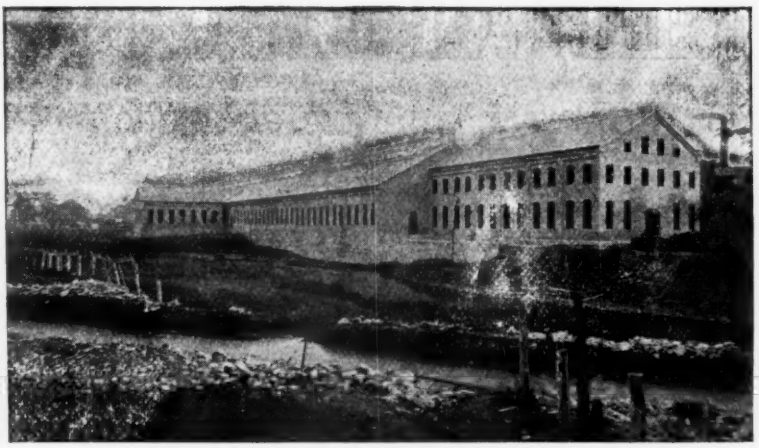
Wrought Iron Bridge Co.,

DESIGNERS AND BUILDERS IN
IRON AND STEEL
FIRE PROOF BUILDINGS



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—FOR—
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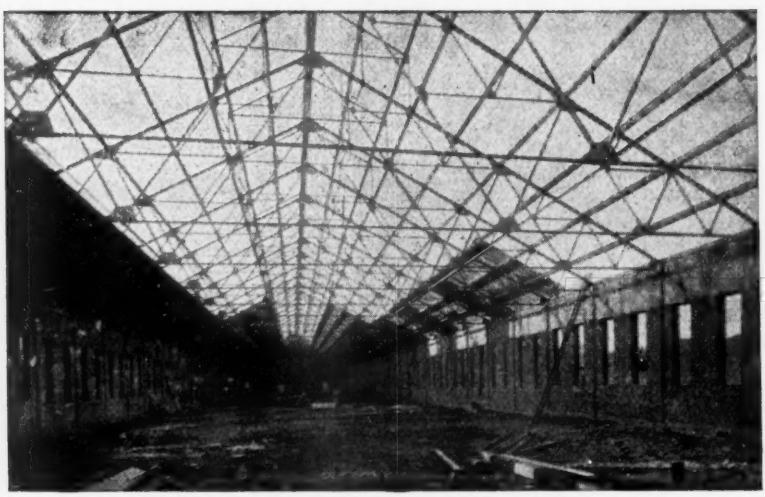
Exterior of Foundry of Warder, Bushnell & Glessner Co., Springfield, Ohio.

Traveling and Jib Cranes for handling
Heavy Castings and Machinery.



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Interior Foundry Building of Warder, Bushnell & Glessner Co., Springfield, Ohio.

The roof of this building was erected by the Wrought Iron Bridge Co., Canton, Ohio, and consists of steel trusses supporting wooden purlins to which matched and dressed sheeting is nailed for slating. Trusses being 18 ft. above the floor, the wood work of roof is out of danger from fire, while the cover being of slate a suitable cornice to protect the overhanging of roof from flying sparks, or heat from the burning of neighboring buildings, renders this structure absolutely fire proof. Windows are set in the sides of ventilator throughout its entire length, so that ample light and ventilation is insured.

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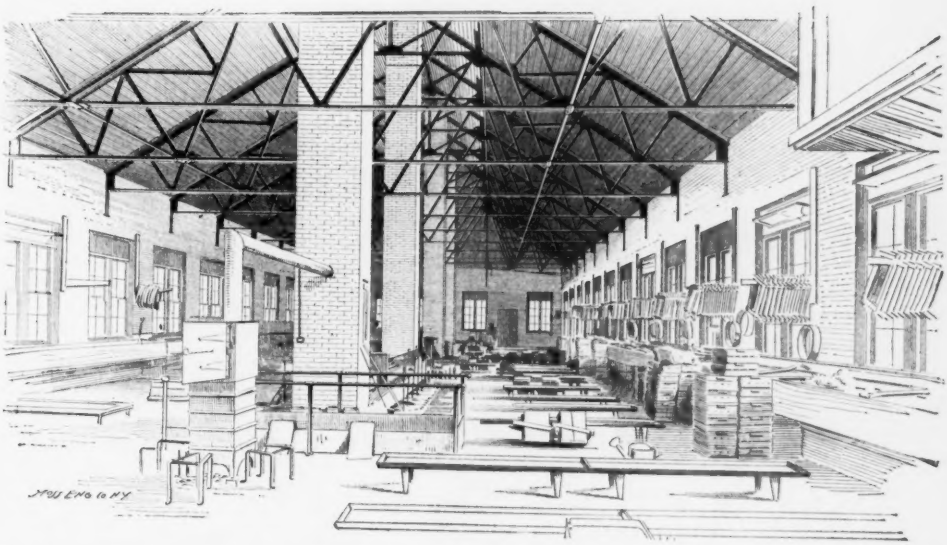
ENGINEERS, ARCHITECTS

—AND BUILDERS OF—

Iron and Steel Bridges, Roofs and Buildings.



The above illustration is taken direct from a photograph and shows the interior of a Brass Foundry designed and built by us for Edward Miller & Co., Meriden, Conn.

The building is 46 feet in width and 122 feet in length, covered with an Iron Truss Roof and ventilated by our Improved Ventilator, fitted with corrugated iron shutters opening and closing by cords from the floor.

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There are more Manufacturing Industries located on the lines of THE BURLINGTON ROUTE than on any other railroad in the United States

The interests of THE BURLINGTON ROUTE AND THOSE OF A MANUFACTURER OR LOCATOR UPON ITS LINES, ARE MUTUAL.

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This Department will make the work and worry of seeking a suitable and advantageous location easy for you.

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And all Points in Colorado, Utah and California,

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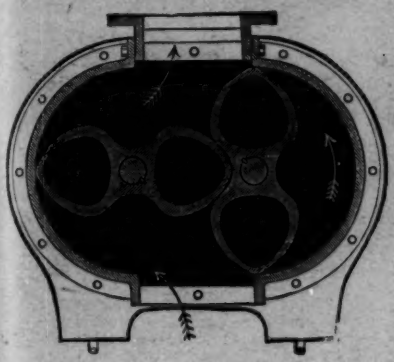

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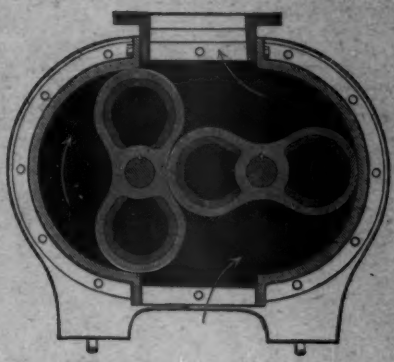
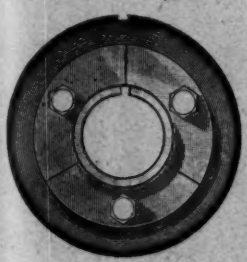
1895



Roots' Standard Blower.
Best adapted to all kinds of smelting purposes, forced draught or suction.

Roots' True Circle Blower.
Best adapted to high pressures, pneumatic tubes, etc.



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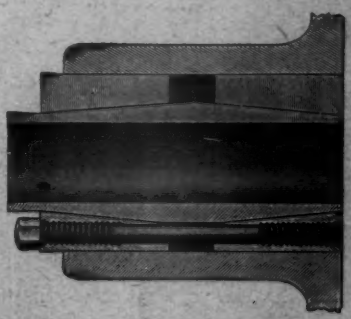

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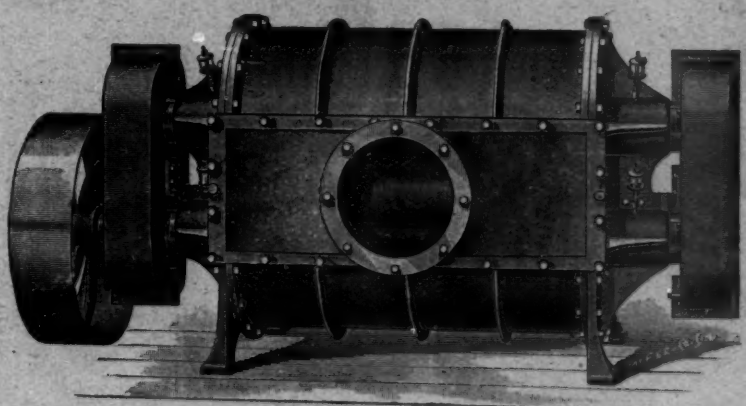

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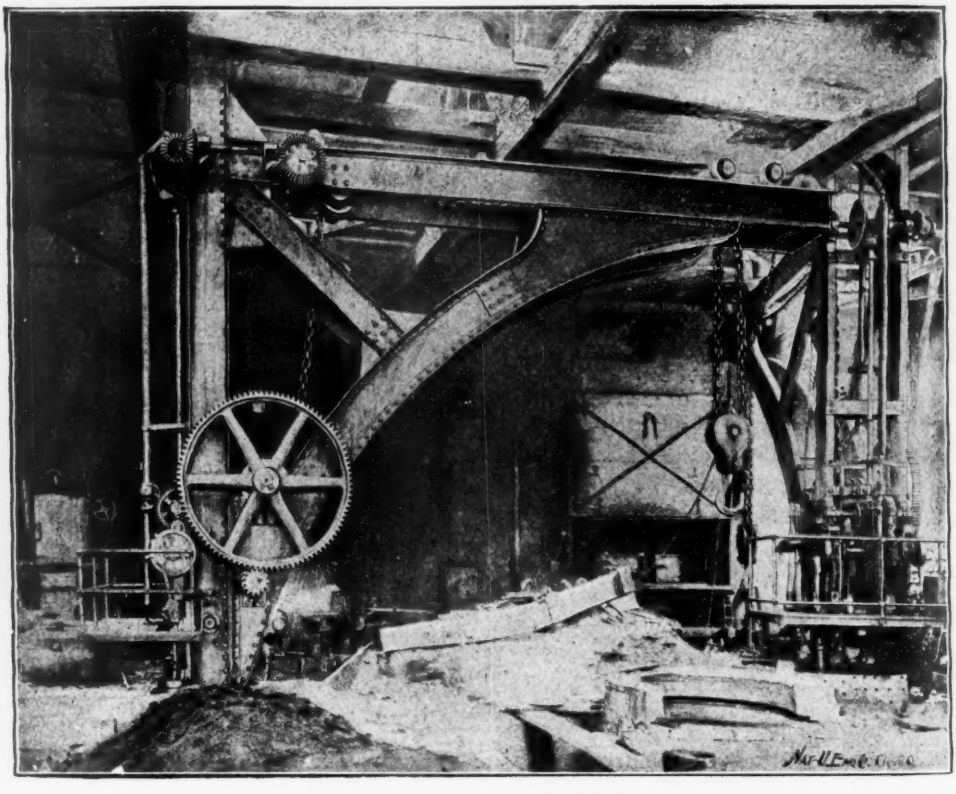

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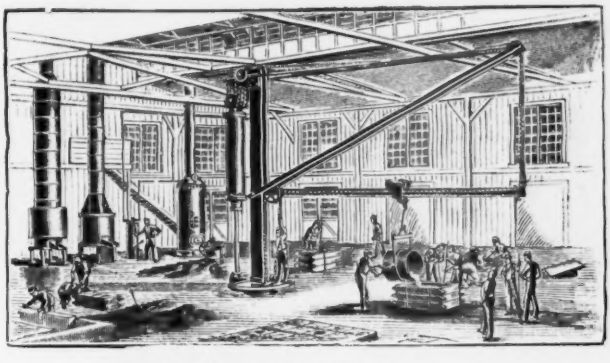

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Signed by one of the largest and best equipped foundries in the West, employing over 1,600 men.

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DEAR SIRS: Answering yours in regard to Cranes from you will say, *I fully agree with you in saying they are the Best Foundry Cranes on Earth to-day. There is not one objectional feature in them.* We have them in constant use. Our molders' helpers operate them with perfect satisfaction.

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DEAR SIRS: I wonld say we are well pleased with the service of your Steam-Hydraulic Crane. As you know we have eight of them in our works, four of which are in hourly service day and night handling plate iron, and operated by unskilled labor. The service is constant and severe and yet the repairs to your Cranes during the three or four years we have had them has been very little.

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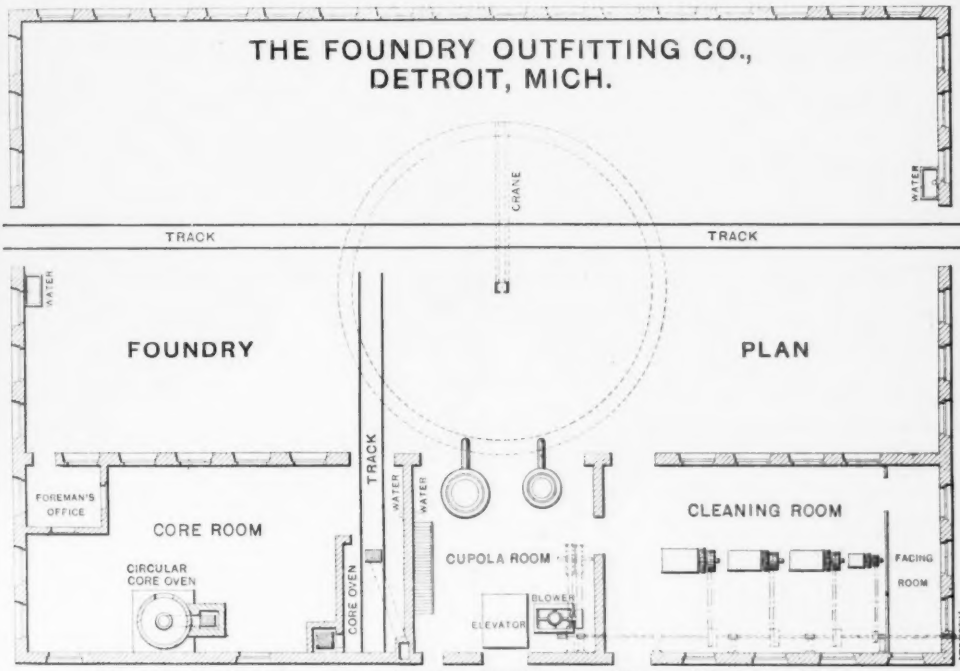

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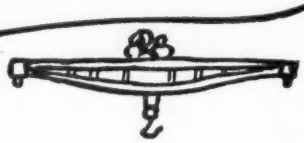

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Ash,	10.66
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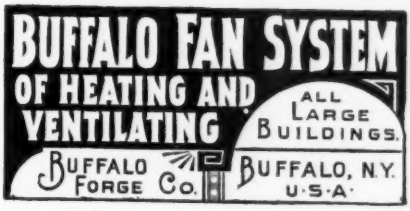
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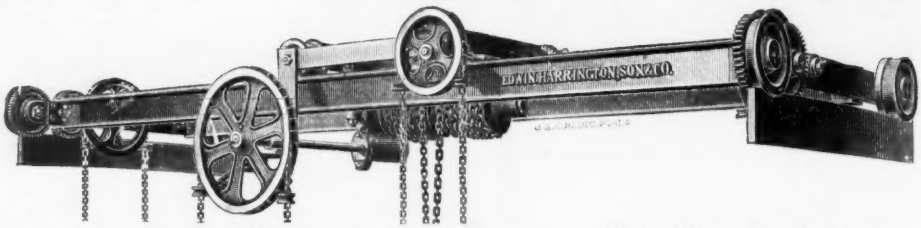

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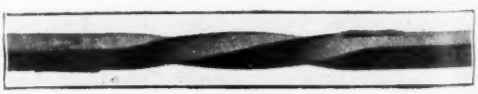

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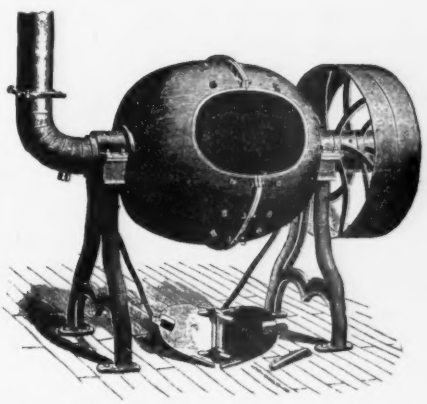

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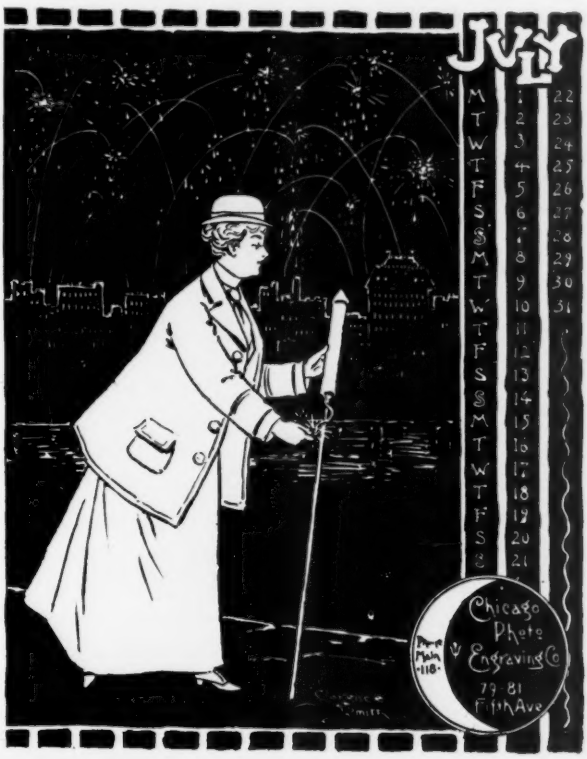

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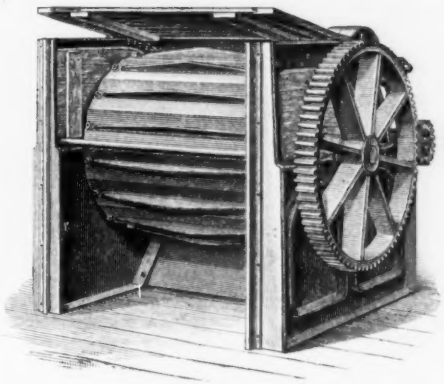

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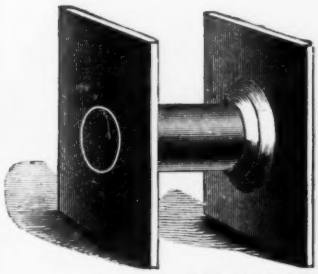
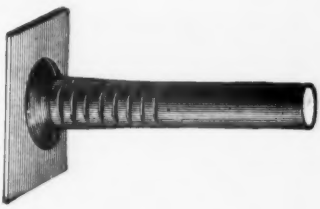


Do not be Alarmed

We are still in the RING and here to STAY. . .



SEND US YOUR ORDERS

AND WE WILL GUARANTEE THE GOODS AND PRICES.

Cleveland Chaplet & Mfg. Co.

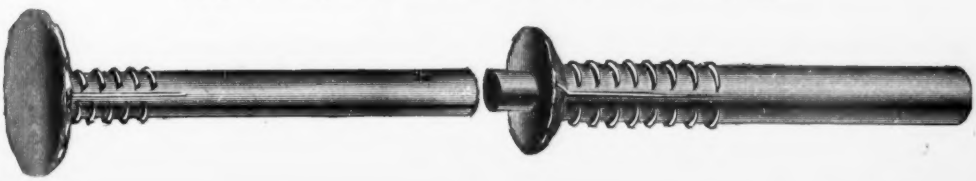
CLEVELAND, OHIO.

MANUFACTURERS OF

CHAPLETS AND CHAPLET STEMS

Stove Rods, Scrapers, Pokers, Towel Rods and Nickel Plated Stove Trimmings

FOR WATER-BACKS USE OUR TINNED CHAPLETS.



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THE FOUNDRY

The only foundry paper published in the world, and an authority on all matters pertaining to the foundry business.

RATES OF SUBSCRIPTION.

Single subscription to all parts of the United States and Canada, $1 per annum.
" " Universal Postal Union, 1.50 "
Eight or more subscriptions at one time, 75 cents each.

ADVERTISNG RATES.

One page - -	per month, $20.00
Half page - - -	" 12.00
Quarter page - -	" 7.00

When space is specified an extra charge of five per cent. on the above figures will be made. All pages between front cover and reading matter reserved for whole page advertisements.

Advertisers in THE FOUNDRY have the privilege of discontinuing their advertisements at any time after they have had three insertions, and will only be charged pro rata for the number of insertions printed. They also have the privilege of changing advertisements as often as desired.

The publishers of THE FOUNDRY appreciate the fact that it is customary for publications, especially the class known as Trade Journals, to quote a rate for advertising from which greater or less discounts are given, according to the persistency of the advertiser. This system is manifestly unfair as tending to show partiality. We have deducted the usual discount before quoting rates, thus giving it to all alike, and no reduction of any sort on the above rates can be made.

Copy for advertisements should be in by the 25th of the month preceding publication.

The A B C of Iron.

The best book for foundrymen published. It is issued in handsome cloth binding, and gives much valuable matter on how to reduce cost of mixtures, and on grading and numbering of pig-iron.

FORMER PRICE $2.00

NOW $1.00.

Order Now of

Foundry Publishing Co.

Griswold Street,

DETROIT, - - MICH.

ALUMINUM
MANGANESE
PHOSPHOR

BRONZE

And BRASS CASTINGS of Every Description, Heavy or Light. Let us figure on your wants.

E. Stebbins Mfg. Co.,

BRIGHTWOOD,
MASS.

BINDERS FOR THE FOUNDRY.

EVERY SUBSCRIBER SHOULD HAVE A . . . . . .

..BINDER..

AND PRESERVE EVERY COPY OF HIS PAPER. . . .

After looking the field carefully over, we have at last selected a Binder that will give, we think, perfect satisfaction, and which we can cordially recommend. Will hold 12 copies.

SENT POSTPAID ON RECEIPT OF $1 00.

The Foundry Publishing Co.,

DETROIT, MICH.

$5.00.

The Pocket Kodak

Does everything photographic, yet slips into the pocket easily and weighs only 5 ounces. Makes pictures big enough to be good for something and good enough to enlarge to any size. Made of aluminum, covered with fine leather. Rich and dainty in finish.

EASTMAN KODAK CO.

Sample photo and booklet for two 2-cent stamps.

Rochester, N. Y.

"THE IRON FOUNDER" SUPPLEMENT

A COMPLETE ILLUSTRATED EXPOSITION OF

The Art of Casting in Iron.

COMPRISING THE

ERECTION AND MANAGEMENT OF CUPOLAS, REVERBERATORY FURNACES, BLOWERS, DAMS, LADLES, ETC.; MIXING CAST IRON; FOUNDING OF CHILLED CAR-WHEELS; MALLEABLE IRON CASTINGS; FOUNDRY EQUIPMENTS AND APPLIANCES; GEAR MOLDING MACHINES; MOLDING MACHINES; BURNING; CHILLING; SOFTENING; ANNEALING; POURING AND FEEDING; FOUNDRY MATERIALS; ADVANCED MOLDING; MEASUREMENT OF CASTINGS; WROUGHT IRON STEEL, ETC.

ALSO

THE FOUNDING OF STATUES; THE ART OF TAKING CASTS; PATTERN MODELLING; USEFUL FOMULAS AND TABLES.

BY SIMPSON BOLLAND,

Practical Molder and Manager of Foundries; Author of "The Iron Founder," etc.

400 Pages. Fully Illustrated.

Price $2.50, Post-Paid; with THE FOUNDRY, one year $3.00.

FLORIDA

And the Sunny South.

VIA

BIG FOUR ROUTE.

The frosty mornings, the chilly nights, are the first warning notes from Winter's trumpet, and we watch the Sun in his southward course, longing to follow him to a land where it is summer always.

Are you going south this winter?

The "Big Four Route" is the best line from Chicago, Peoria, St. Louis, Cleveland, Columbus, Indianapolis, Benton Harbor, Sandusky and intermediate points, with Solid Vestibuled trains, Buffet Parlor Cars, Wagner Sleeping Cars and Dining Cars to Cincinnati, where direct connections are made with solid trains with Pullman Sleeping Cars of the Chesapeake & Ohio, Queen & Crescent Route and Louisville & Nashville Railways, to Hot Springs, Old Point Comfort and all points in Virginia and The Carolines; to New Orleans and all principal cities in the south.

Through Wagner and Pullman Sleeping Cars daily between St. Louis and Washington via the "Big Four" and the picturesque C. & O. Ry.

Tourists rates will be in effect.

Call on or address any Agent of the Big Four Route or its connecting lines, or address

E O McCORMICK, Pass'r Traffic Manager,
D. B. MARTIN, Gen. Pass. & Tkt Agt
"BIG FOUR ROUTE" CINCINNATI, O.

C H & D

CINCINNATI, HAMILTON & DAYTON R. R.

Only line running Pullman Vestibuled Trains

Cincinnati, Indianapolis,

CHICAGO!

Only direct line between

Cincinnati, Dayton, Lima, Toledo, Detroit and

THE LAKES!

Through Car Service to St. Louis, Springfield, Ills., Koekuk and

THE WEST!

D G. EDWARDS, G. P. & T. A., Cincinnati, O.

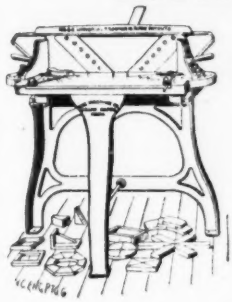
A REVOLUTION

In Pattern Making was the result of the introduction of the

FOX UNIVERSAL TRIMMER

Our first machines were considered marvelous time and money savers, as they saved fully one quarter of the cost of patterns. Our latest machine, **STYLE E,** is a combination of utility and convenience such as our ten years of experience in this line has proved essential and desirable

ACCURATE! POWERFUL! CONVENIENT!

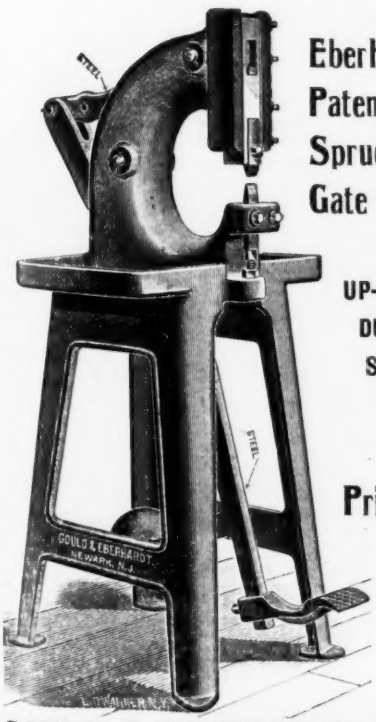


Fox Machine Co.

315 North Front Street,

GRAND RAPIDS, - MICH.

Sent out on Trial anywhere in the U. S.



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UP-TO-DATE
DURABLE
STRONG
NEAT

Price Low

Send to

GOULD & EBERHARDT, NEWARK, N. J.

Black Baking Enamel

AND

AIR DRYING JAPAN

For Light Iron, Hardware, Etc

Shellac Varnishes

For Patterns.

—THE—

Cleveland Varnish Co.

Makers,

CLEVELAND, - OHIO

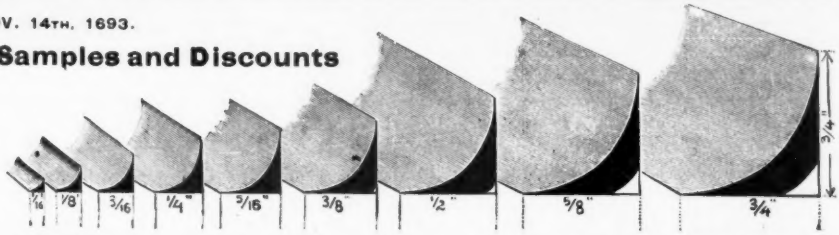
PATTERNS FOR CASTINGS.

ANYTHING, from a Toy Pistol to a Steel Plant.
Largest Pattern Works in the World.

The Gobeille Pattern Co., Cleveland, O.

PATENTED NOV. 14TH, 1693.

Write for Samples and Discounts



Pattern Makers and Founders

Should use none but the **BELDING PATENT LEATHER FILLET,** the only one made scientifically correct. Quickly applied to any corner, straight surface, single or compound curves, wood or iron, without nails or clamps. Once used, always used. Send sample order. **Proper Discounts will be Allowed You.**

THE CANTON FILLET CO. **Canton, Ohio.**

Snap Flasks . .

All styles and sizes. The cut shows our **Solid Taper Snap Flask** which are unusually light and strongly made of ¾ inch soft maple, well seasoned, fitted with our latest improved hinge and **Automatic Spring Latch.** Tapers ¼ inch to 1 foot, just enough to allow slip boxes to go over molds and fit snug

ADJUSTABLE SNAP FLASK Co

LIBERTY, IND.

SAVE

Your Patterns

Lightning Lifting Screw
Taper Thread

BY USING **FRASER'S PATENT RAPPING PLATES AND LIFTING SCREWS.**

Pattern Letters and Figures, Flask Clamps and Fittings, Leather Fillet Cutters, Universal Trimmers, Dowel Pins, Etc.

MILWAUKEE FOUNDRY SUPPLY COMPANY,

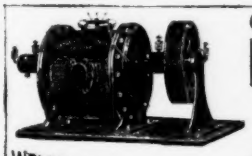
MILWAUKEE, WIS.

Crucibles and Plumbago

We are the only **Crucible** manufacturers in the west, hence most accessible to western manufacturers and dealers, the **Improvements** in the shape and **Durability** of our Crucibles within the last few years, makes them the most **Durable** of any in the market. **Give Us a Trial.** Also Silver Gloss Stove Polish, none better. We handle only **Ceylon or East India Plumbago,** the best in the world and at prices that can't be beat, for Lubricants, Facings, Paints, etc. Send for samples with quotations and we will give you satisfaction.

HUSSMAN CRUCIBLE CO.

215 Mermod & Jaccard Bld. ST. LOUIS, MO.



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NO GEARS

SAVES 10 TO 15% IN POWER

SIMPLE — POSITIVE — EFFICIENT

WRITE FOR CATALOGUE.

GARDEN CITY FAN CO. CHICAGO, ILL. U.S.A.

DO NOT BE DECEIVED—THERE IS ONLY ONE GENUINE HUNTINGTON.

An Extra 10 per cent WILL BE GIVEN ANY-ONE WHO MENTIONS "THE FOUNDRY."

PRICES REDUCED.

IN ORDERING ASK FOR THE FOUNDRY PATTERN.

EACH SET OF OUR CUTTERS IS PUT IN A PAPER BOX.

THE CHICAGO SCREW CO., CHICAGO.

Sole Manufacturers of Genuine Huntington Emery Wheel Dresser.

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SPECIAL FOR PATTERNS.
Samples Free.

ECONOMIC VARNISH CANS

Brass Dowels for Large Work.
Pegs 1 inch diameter.

BRASS DOWELS

Samples Free.
Plate Brass Dowels. Peg and Cup Brass Dowels.

Steel Rapping Plates,

Metallic Letters and Figures.
Metallic Fillet,
Steel Shrink Rules.

TIMMIS & CLISSOLD,

21 Cherry Street,
BOUND BROOK, N. J.

Improvement in Core Work

W. H. STEWART'S

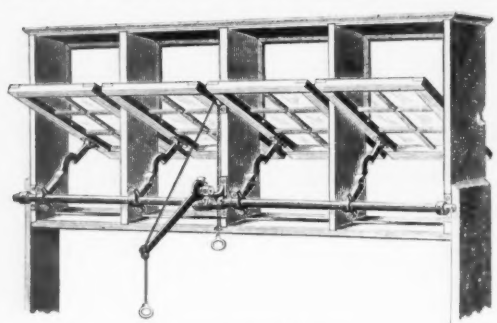
FOUNDERS' Core Compound

Used by the Principal Foundries in the U. S.

Prepared ready for use in **LIQUID FORM** to be mixed with the regular core sand. The cores are **DAMP-PROOF** and do not absorb moisture. **SPUTTERING** and **BLOWING** by reason of damp cores are avoided. The cores are **HARDER, FIRMER** and **STRONGER** than can be made by any other process and cost less to make. They can be set at any time and **EASILY CLEANED FROM THE CASTING.** Send for our descriptive pamphlet with prices and directions for use.

W. H. STEWART,
SOLE MANUFACTURER,
182 FRONT ST. NEW YORK.

THE NATIONAL SELF-LOCKING VENTILATOR IRONS



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For Foundries, Annealing Shops, Blacksmith Shops, Dye Houses, Abattoirs, Medical Colleges, Weave Sheds, Green Houses, Rolling Mills, Glass Works and all places where Ventilators are used.

Simple, always in order and always Locked, whether open or closed; no slamming.

Manufactured and for Sale by

THOMAS DEVLIN & CO.

Lehigh Ave and 3rd St., PHILADELPHIA, PA.
CIRCULAR SENT ON APPLICATION.

TO FLORIDA & TO NEW ORLEANS VIA THE QUEEN & CRESCENT ROUTE

Superb Vestibuled Trains FROM CINCINNATI

To Lexington, Chattanooga, Birmingham, Meridian, New Orleans, Atlanta, Macon and Jacksonville.

Through Sleeping Cars to Birmingham, Columbus, Albany, Knoxville, Asheville, Jackson, Vicksburg and Shreveport.

Through Tourist Sleeper, Cincinnati to Los Angeles and San Francisco every Thursday. Direct Route to the Southwest via New Orleans or via Shreveport.

3 DAILY TRAINS TO CHATTANOOGA
Send for Literature and Time Tables.

C. A. BAIRD, T. P. A. Cor. Woodward & Jefferson, Detroit, Mich.

DIXON'S No 2441
GRAPHITE FACING

Made of Ticonderoga Graphite; Better than Ceylon Lead; Better than Silver Lead; Behaves well under the Slicker; Will not wash before the metal; Adheres well to the Sand; Burns slowly so the Gases are nicely relieved.

No. 2441 MEANS PROGRESS IN FACINGS.

SEND FOR AN ENVELOPE SAMPLE.

Jos. Dixon Crucible Co., JERSEY CITY, New Jersey.

The Albany Facing Mill Co.

MANUFACTURERS OF

CEYLON LEADS

Stove Plate and Return Facing, Pine Limb Charcoal, Soapstone Facing, Core Wash and Core Compound.

STOVE PUTTY Shovels, Riddles and Brushes.

Shippers of the well known ALBANY MOLDING SAND.

The Albany Facing Mill Co. ALBANY, NEW YORK

THE REASON WHY

.. YOU SHOULD USE ..

"Standard" Cupola Blocks

IS BECAUSE THEY ARE BETTER AND CHEAPER THAN OTHERS.

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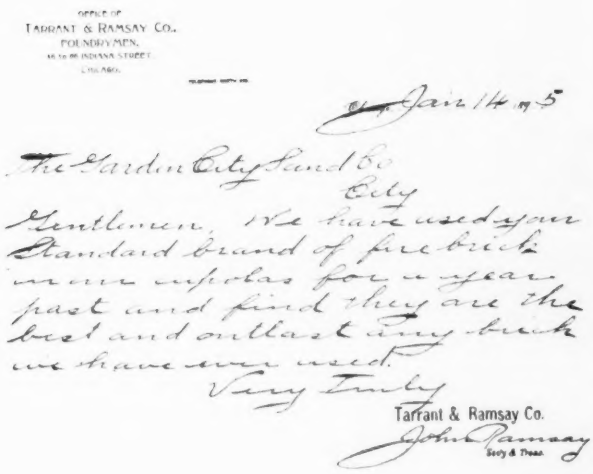
OFFICE OF
TARRANT & RAMSAY CO.
FOUNDRYMEN.
[illegible] INDIANA STREET
CHICAGO.

Jan 14 1895

The Garden City Sand Co
City

Gentlemen, We have used your Standard brand of fire brick in our cupolas for a year past and find they are the best and outlast any brick we have ever used.

Very truly
Tarrant & Ramsay Co.
John Ramsay
Secy & Treas

See what one of the Leading Chicago Foundries say about "Standard" Cupola Blocks. Can you afford to allow your competitors to have the "best of it."

IN ADDITION TO THE ABOVE, PLEASE REMEMBER WHEN YOU WANT

Moulding Sand, Fire Brick, Facings, Shovels, Brushes, Riddles, Blakeny Cupolas, Etc.

TO BE SURE AND GET OUR PRICES.

WE GUARANTEE EVERYTHING WE SELL. WHY NOT WRITE US.

GARDEN CITY SAND CO.

FIFTH AVENUE AND MADISON STREET,

SECURITY BUILDING. CHICAGO.